NUMBER SEVENTEEN NOTES FROM THE SHOP

Woodsmith™

TECHNIQUE: STEP BY STEP TO MAKING A TAMBOUR (ROLL TOP)

JOINERY: HOW TO CUT A BOX (FINGER) JOINT

SIX-DRAWER CHEST

TAMBOUR STEREO CABINET

Woodsmith

Number Seventeen September, 1981

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Sawdust

ABOUT THIS ISSUE

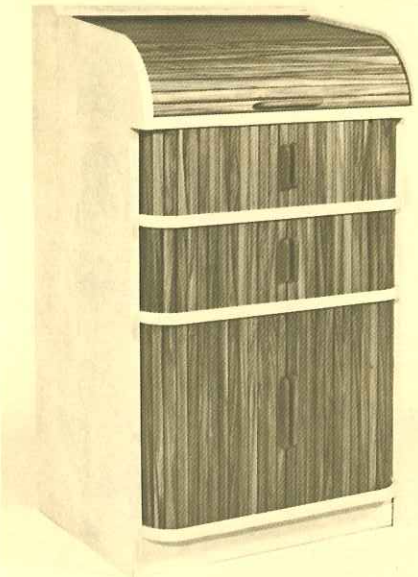
There's a tendency to think of woodworking as a precise science. With phrases like, "Cut exactly on the line" and "Measure exactly 3" from the end", it's no wonder we tend to get bogged down in detail.

For instance, we give exact measurements in the Materials Lists for each project. If it says a piece is 15 3/16" long, then one could naturally assume that it's cut *exactly* 15 3/16" long.

That's not true. All of these measurements should be used as guidelines. In other words, don't commit yourself to a number on a ruler. Rather, cut to fit. Almost every cut we make is based on a previous cut, not on a measurement. It's this flexibility that will yield the best results.

I guess this idea of flexibility is on my mind because of the Stereo Cabinet in this issue. I had been playing around with the idea of this cabinet for several months.

I sketched out some plans of how I thought it should look. Then it was a matter of deciding the final dimensions. We went out and measured a lot of stereo gear, trying to come up with some standard dimensions. That turned out to be pure folly. Only a politician could come up with such a compromise.



I finally settled on some dimensions that fit the stereo equipment we had on hand. Then I built the cabinet. That is, I built the first cabinet (shown in the photo above).

I was trying to achieve the 'look' of an old time juke box. Almost everybody who saw it loved the idea of the tambours. And they were very polite about the way it looked.

The second attempt was more to everyone's liking (page 6). It's impossible to show the reaction when someone sees this cabinet and tries desperately to restrain the urge to slide those tambours. It's like watching a kid in a candy store (even if the kid happens to be yourself).

While I'm on the subject of tambours, I'd like to mention a couple of things. The type of tambours we're showing in this issue are very easy to make. Granted, there are fancier ways of making them, but we'll save that for another time.

Many of our subscribers have the plans for the Roll-Top Bread Box, which gives a more detailed, step-by-step method for making (particularly cutting) the tambours. If you don't have these plans, and would like them, we're offering them to subscribers for only $1.00 (enough to cover the cost of printing and postage). To non-subscribers, the cost is $3.00.

NOTES AND THOUGHTS

There are two things about the make-up of this issue I'd like to mention.

SEE PAGE... One of the most irritating things in any magazine article is those three little words: "Continued on page ..." Although we're able to avoid this break in the action because we don't have any advertising, we do tend to 'break up' articles.

In this issue, there are, in effect, two articles: one on tambours and one on box joints. But we've broken them up into a series of articles that show joinery, projects, tools, and special applications. As a result, the words "See page ..." will often appear.

I realize this approach can be rather disconcerting on the first reading. But I hope that it will make reference at some later date a little easier.

DAMAGED COPIES. From time to time we get letters saying that the latest issue of *Woodsmith* arrived in less than perfect condition. Once it's in the hands of the Post Office, there's not much we can do.

But to try to help this situation, we have added a wrapper to the outside of this issue. I hope this saves some of the wear and tear on your copy as it makes its way through the postal system. However, if your copy is damaged in any way (or if there's a problem with the printing), just let us know and we'll send out a new copy — this time in an envelope. There's no charge for a replacement copy. (You paid for a good copy and you should get one.)

NEXT MAILING: November, 1981.

Tips & Techniques

CLEANING SAW BLADES

The easiest (and cheapest) way I know of to clean gummed-up saw blades is with lye and water. Mix one ounce lye to one cup water. Brush this mixture on the saw blade with an old brush. (Wear rubber gloves, because the lye can irritate your skin.)

This lye/water mixture will clean the tar and pitch off the sawblade as fast as you can brush it on. When the saw blade is clean, rinse it with clean water and dry it thoroughly to prevent rust.

Don Boomer
Visalia, California

SAWDUST/GLUE FILLER

In our shop at school, a common filler (used to fill nail holes or cracks) is a paste made of *Titebond* glue and sawdust. It has the advantage of being cheap, easy, and available. However, its effectiveness depends on the kind of sawdust you choose. A fine, fluffy sawdust from white pine or basswood works well with light-colored woods.

We have run into one problem with this filler. There are times when it turns brown or black. After a little investigation, I found two possible reasons for this discoloration: 1) the source of the sawdust, and 2) the type of applicator used.

It seems that one of the convenient places to get fine sawdust is around a belt sander. But this sanding dust turns dark brown when mixed with *Titebond*. (Perhaps the heat generated during sanding causes a change in the wood fibers.)

Another source of discoloration can be the applicator. A reaction between the metal in a putty knife and the glue can make the filler turn black. The solution to this is close at hand. Make an applicator from a piece of scrap wood about the size of a tongue depressor, but feather one end on a sander. This applicator is more effective than a putty knife, there's no problem with discoloration, and it's disposable.

John M. Wilson
Charlotte, Michigan

DRIPPY RIMS

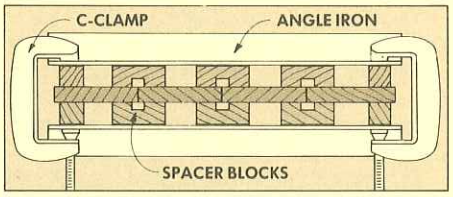
If you're having trouble getting paint or any thick finish out of the rim of the can, here's a simple solution. When you first open the can, take an awl and punch a half dozen holes in the bottom of the rim. The paint or finish will drain right back into the can, and the lid will seal the holes.

R. C. Zimmerman
Kent, Minnesota

CLAMP FOR TABLE TOPS

Re: Your article on Building A Table Top, *Woodsmith* No. Fifteen.

When gluing up large table tops with pipe clamps, I find that even hand screws across the end of the boards do not eliminate cupping in the center of the top. I clamp heavy gauge angle iron over slotted blocks to level the top (see drawing). To



make the blocks, cut a groove down the center of a 2x4, then cut off as many 3" lengths as you need.) This method works especially well when gluing-up butt-jointed tops.

Daniel T. Walters
St. Paul, Minnesota

STOP FOR RADIAL ARM SAW

When you need to cut off several pieces of identical length on a radial arm saw, the easiest way is to clamp a stop on the fence. However, there is a problem. The cut-off piece can bind between the blade and the stop during the cut.

To prevent this, I use a common butt hinge as a stop. Clamp the opened hinge to the fence. Then after the stock is in position, swing the unclamped portion of the hinge out of the way so the cut-off doesn't bind.

Haig S. Nalbandian
Hingham, Massachusettes

GLASS SCRAPER

In *Woodsmith* No. Thirteen you had articles on using a scraper blade and how to cut glass. Now, combine the two.

I cut 3"x5" pieces of glass to use as scrapers. These are excellent for removing dried glue from tight corners. A glass scraper is also easy to sharpen — when the edge gets dull, just cut a little more off for a new sharp cutting edge.

Leonard G. Trujillo
Enon, Ohio

MEASURE AND MIX

When mixing resin and oil finishes (or any other finish which requires different proportions), I use a very simple method that cuts down on the mess.

I scribe marks on a stick, equal distance apart. These marks are used to determine the numbers of parts of each liquid to pour into the container.

Jim Jacobs
Hootings, Minnesota

BRAD HOLDER

Whenever I have to put a fine wire brad into a tight corner, my fingers are always too thick, too short, or just don't fit. So, to solve this problem, I push the brad into a piece of heavy paper that's tapered to a triangle.

Then it's relatively easy to place the brad into the corner, tap it about half-way down, and pull out the paper for final setting. No more flat fingers.

Bud Bezark
San Jose, California

TOBACCO STAIN

Many times when repairing old oak furniture I must use new oak to make the repair. If you've ever done this, you know how tough it is to make new wood look like it's old.

To 'age' the oak, I've been using this mixture for years. Buy one plug of chewing tobacco (not the sugar-cured kind). Break the plug into pieces and place them in a 1 qt. jar that has a lid. Now add kerosene and put the lid on the jar. (Use Saran wrap under the lid for a tight seal.)

Wait about a week. Then pour the mixture through a strainer to remove the tobacco (save it for later use). The dark liquid that remains can be used as you would any oil stain.

Bud Bezark
San Jose, California

SEND IN YOUR IDEAS

We invite you to share your woodworking tips and techniques with other readers of *Woodsmith*. We will pay a minimum of $10 for a tip, and $15 or more for a special technique. All material submitted becomes the property of Woodsmith Publishing Co. Upon payment, you give *Woodsmith* the right to use the material in any manner for as long as we wish.

If your idea involves a drawing or photo to explain it, do your best and, if necessary, we'll make a new drawing, or build the project or jig and photograph it. (Any drawings or photos submitted cannot be returned.)

Send your ideas to: *Woodsmith*, Tips & Techniques, 2200 Grand Ave., Des Moines, Iowa 50312.

How To Make A Tambour

MAGIC FROM STRIPS OF WOOD

When anyone sees a tambour, the first question is always, "How does it work?" That's quickly followed by an irresistible urge to make it move . . . to watch those strips of wood move along their gently curving path. And then, of course, there's the challenge of trying to figure out the magic behind it all.

But like all things magic, knowing the answer takes most (but not all) of the fun out of it. A tambour is just some strips of wood with a piece of canvas glued on the back. But making a tambour, and making it work are two different things.

THE TAMBOUR GROOVE

In order for the tambour to perform its magic, it must have a pathway (or groove) to follow. The geometry of this groove must permit the tambour to slide easily, yet not be so loose that it rattles around.

Since most tambours are made of strips of wood about ¼" thick and ¾" wide, it's relatively easy (through trial and error) to determine some minimums for the groove. What I finally arrived at is that the groove should be a minimum of 5/16" wide, and wherever it curves, the minimum radius could be 1½", see Fig. 1.

Shop Note: Some tambours are much thicker than ¼". However, these are usually rabbeted on the two outside edges so only a ¼"-thick 'tongue' actually rides in the tambour grooves. So, these same dimensions apply.

Cutting the rounded corners for the pathway presents some problems. One method is to use a template made of ¼" plywood cut to the shape of the pathway you want. Then by attaching a bushing (sometimes called a template guide) to the bottom of the router, the groove can be easily routed.

Another method (the one I used for both the projects in this issue) is to use a router with a pivoting (trammel point) attachment, Fig. 2. *Sears* recently brought out this attachment (the *Sears* Multi-purpose Edge Guide, No. 25179) which allows you to rout along a radius. Basically, the position of the radius is marked on the workpiece and then routed. Then the straight line portions of the groove are routed to meet the radius.

CUTTING THE TAMBOUR STRIPS

Each of the strips that make up the tambour can be cut in almost any profile you want. (This is assuming the tambour groove is a "C" shape and not an "S" or double curve shape.)

The thickness and width of each tambour strip must be considered. To keep things simple I usually cut each tambour strip ¼" thick and either ¾" or 13/16" wide. The easiest way to get strips like this is to simply rip them off the edge of a board. However, each strip must then be sanded individually to remove the saw marks.

To avoid this sanding routine, I plane and sand both faces of the board first. Then the board is resawed into a ¼" thick 'slabs' and the individual strips are ripped off. This sounds crazy . . . a whole lot of work just to avoid a little more sanding?

The advantage of this method is that you retain the grain pattern on the face of the tambour strips. Or conversely, you can avoid an unsightly edge grain pattern (on oak or maple for instance).

THE RESAWING METHOD

If this method of resawing is chosen, the board for the tambour strips is first planed and sanded on both faces. Then to resaw the board of a ¼" thickness I used the set-up shown in Fig. 3. Basically, I use a finger clamp to hold the board against the fence. The finger clamp is blocked-up so it applies pressure at approximately the center of the workpiece. (The extra board at 90° just holds the finger clamp in place.)

When resawing, I use a 40-tooth carbide-tipped blade, making several passes 1" deep each time. After resawing the first ¼" thick 'slab', the waste piece should be thick enough to get another one.

Each of these new boards is marked so the tambour strips can be cut and then arranged in their original positions (to retain the grain pattern).

After cutting the strips, I prefer to round over the edges. This gives the tambour a softer look and at the same time makes visual allowances for the crack line between the strips. Rounding-over can be a somewhat tedious job. In Figs. 5 and 6 we're showing the set-ups for doing this on a table saw or on a router table.

Although both these set-ups look like a spaghetti factory of finger clamps, it's well worth setting them up. The finger clamps hold the strips firmly in place, and also act as guards to protect your fingers.

Once all the strips are cut you should let them 'rest' for a day or so. (Stack them 'Lincoln log' fashion for drying.) You'll probably find that some of them will warp. The misshapen ones are still useful to stir paint, but not much good for making a tambour. (I cut 25% more strips than I need to get enough good ones.)

GLUING ON THE CANVAS BACK

I use a rather simple jig to aid in gluing on the canvas backing, Fig. 7. This jig consists of two 1x2 side bars, each with a rabbet on one edge. (Shop Note: The rabbets on these bars are cut so they're slightly less than ¼" high. This is done so the bar applies pressure to the tambour strips as the screws are tightened).

Screw one side bar to a piece of plywood, then nail a small strip perpendicular to this side bar (use a square). Next screw the other side bar in place.

The screws should be left loose so you can slide the tambour strips between the rabbets. The strips are inserted *face side down*, and pushed tightly together so there are no gaps for glue to seep through. Also, push all of the strips firmly against one of the side bars; this will make trimming the finished tambour much easier. Then tighten the screws in the side bars and nail a front stop in place.

Now cut a piece of canvas to fit over the strips. (Shop Note: I use a light-weight artist's canvas available at art supply stores. Light-weight corduroy or denim could also be used.)

Apply an even coat of glue to the back of the tambour strips. (I use *Titebond* applied with a small paint brush.) Then lay the canvas on the strips and press and smooth it in place.

Allow the glue to dry for about one hour, and then *carefully* remove the tambour from the gluing jig. You'll probably find that some glue has seeped between the strips causing them to stick together. Gently bend the tambour at each crack to separate all the tambour strips. The tambour will curl around as this is done. Then stand it on end (in the curled position) to let the glue dry.

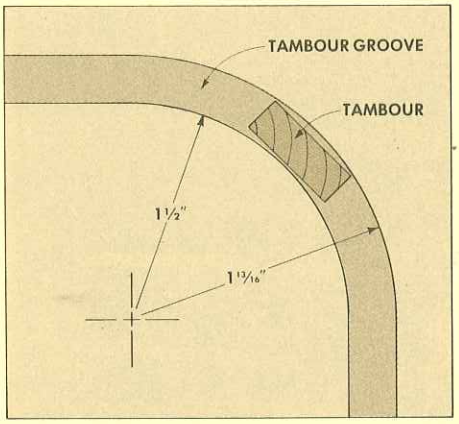
If all the strips were pushed against one of the side bars of the gluing jig, one edge should be lined up. Then it's just a matter of cleaning up the other edge by running the tambour through the saw with the smooth edge against the fence.

Finally, glue a backing strip behind the last tambour strip and screw the lift bar in place — screw only, no glue, so the lift bar can be removed later if necessary.

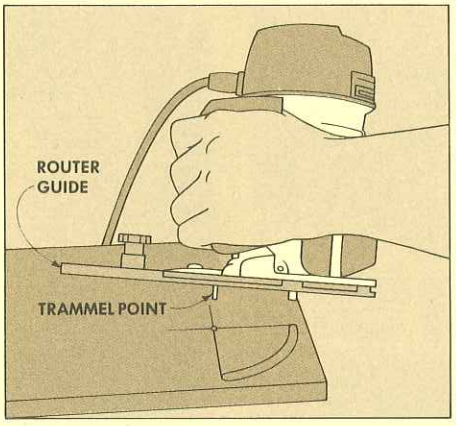
Finishing a tambour can be a bit of a problem. I usually use a spray-on finish (such as *Deft* in a spray can) or a very thinned down version of shellac. It is important to apply the finish with due care so the bond between the wood and the canvas is not disturbed.

Step-By-Step

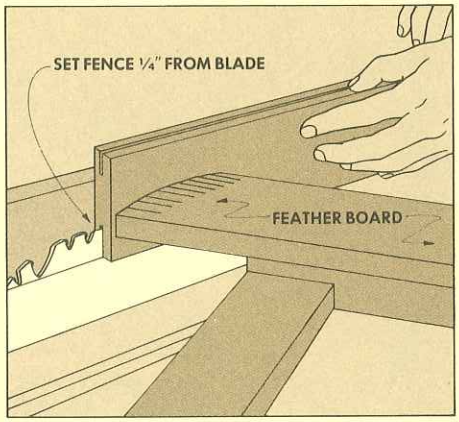
IT'S EASIER THAN IT LOOKS



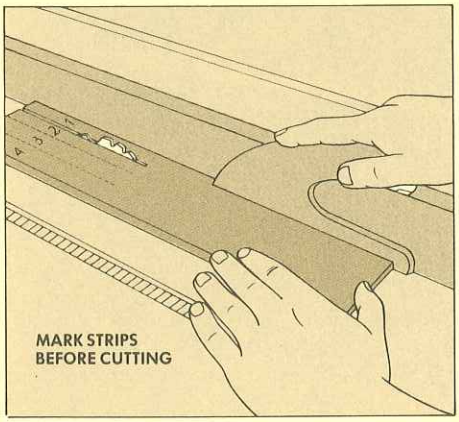
1 *When making a tambour, one of the first considerations is the groove. If each tambour strip is ¼" wide by ¾" long, the minimum radius at any corner is 1½".*



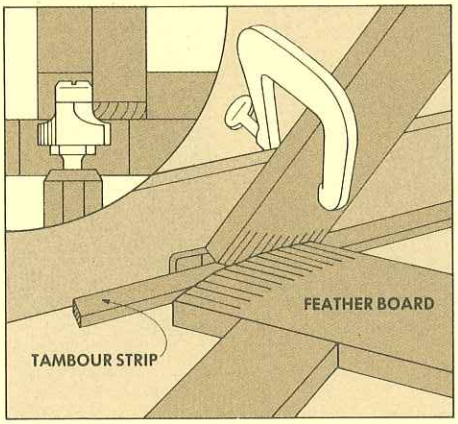
2 *The round corners can be routed by using template, or with the Sears trammel guide. Mark lines from the pivot point and stop the cut at center of lines.*



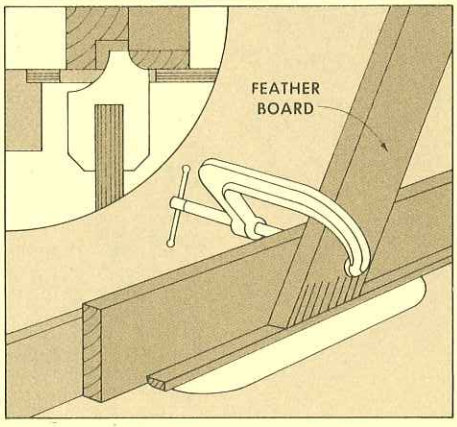
3 *To make the tambour strips, resaw board into ¼"-thick 'slabs'. Use a feather board to hold board against fence and make rip cuts at 1" depth of cut.*



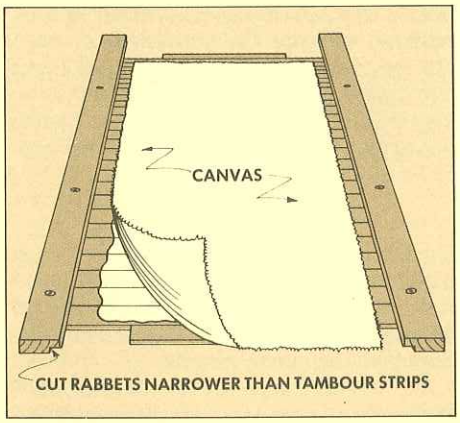
4 *Before ripping tambour strips, clean off any saw marks or burn marks. Then, to retain the grain pattern on the tambour, mark the boards before cutting.*



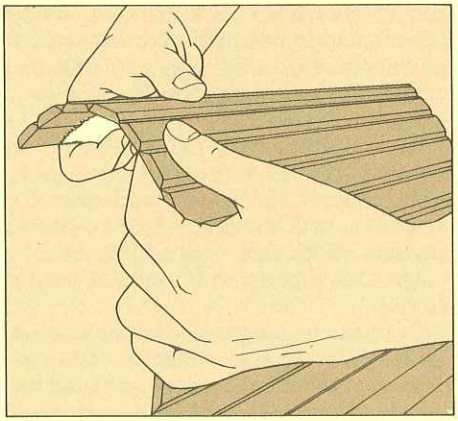
5 *One method of rounding over the edges is on a router table. To hold the tambour strips in position (and to protect your fingers) use feather boards as shown.*



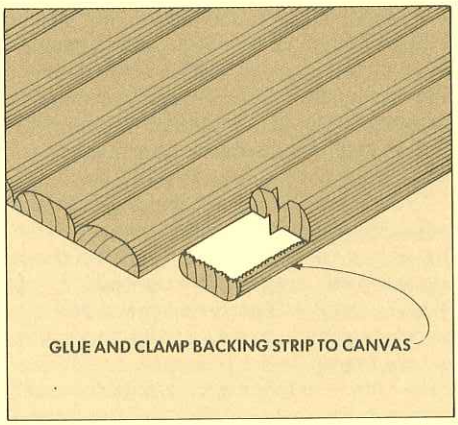
6 *To round-over edges on a table saw, clamp auxiliary (wood) fence over molding head (see detail). Then use feather board to hold tambour strip down.*



7 *Gluing jig consists of two 1x2s with rabbets. Slide strips between rabbets, face side down, and tighten screws. Spread glue evenly and press canvas in place.*



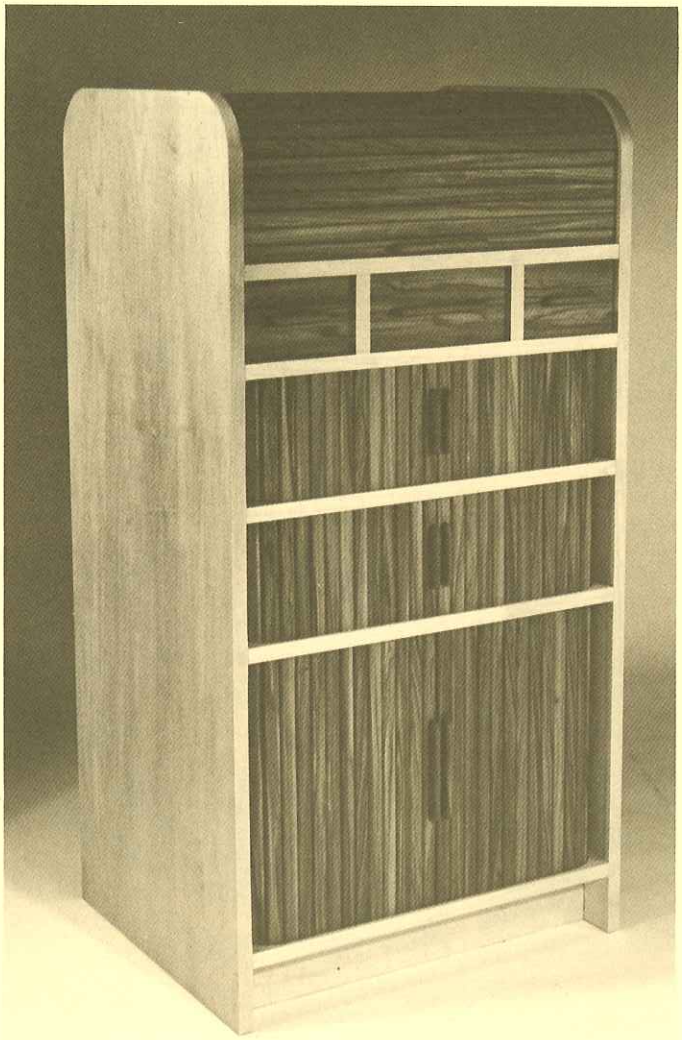
8 *After glue has set for about one hour carefully remove tambour and 'break' tambour strips apart. Stand tambour on edge to allow the glue to cure completely.*



9 *Trim a backing strip so it will clear side of cabinet, then glue it onto back of first tambour. Handle is attached with screws only so it can be removed easily.*

Tambour Stereo Cabinet

ROCK AND ROLL TOP



Whenever anyone mentions the words "roll top" or "tambour" it's almost automatic to assume they're talking about a desk. That's the most popular application of a tambour. But it's certainly not the only one. In fact, a tambour can play two roles: either as a roll-back lid, or as a sliding door.

To be honest, one of the major incentives for building this stereo cabinet was to have the chance to incorporate both of these options in one project. The tambour on top of this stereo cabinet is a typical roll-top lid, rolling back to reveal the turntable, and rolling up to act as a dust cover. The three sets of tambours on the bottom are sliding doors to cover the shelves for the amp, tape deck, and album storage.

Before getting into the actual construction of this cabinet, I'd like to mention two things about the design. First, from the looks of this cabinet you'd think it would be quite an undertaking to build. It's not. All of those tambours make it look difficult, but this whole cabinet goes together quite easily.

Second, although we tried to build this cabinet to hold most types of stereo gear, you'll undoubtedly want to change the dimensions to fit the size of the components you have. With that in mind, we tried to design this cabinet so it could be easily altered.

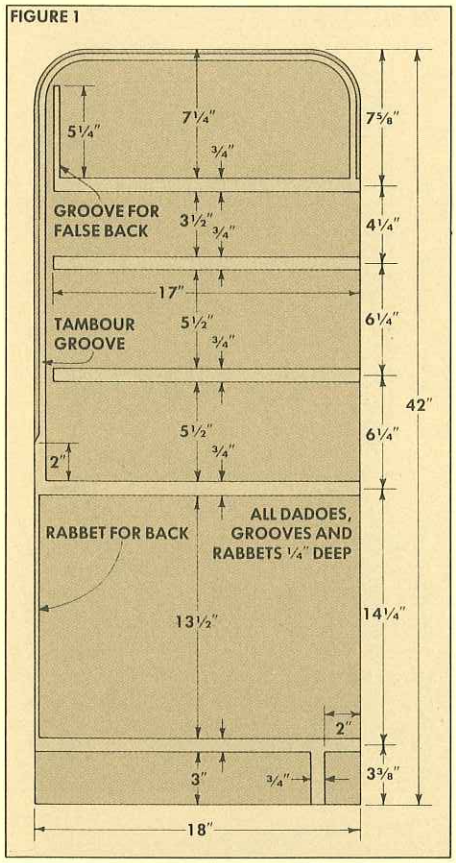
All of the major pieces for the cabinet can be cut from one 4x8 sheet of ¾ plywood. (I used Maple veneer plywood for the cabinet shown here.) The dimensions of all the pieces shown in the Materials List will yield a cabinet with compartments of the following sizes: (These dimensions indicate the maximum space available, not including any space you may want for convenience or proper air movement.)

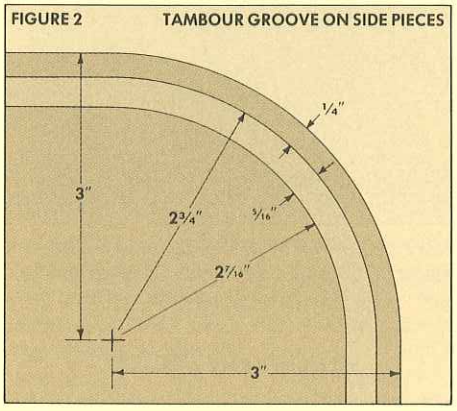
1. Top (for turntable): 20″w, 6⅝″h, 16″d
2. Amp Shelf: 19¼″w, 5½″h, 16½″d
3. Tape Deck Shelf: 19¼″w, 5½″h, 16½″d
4. Album Shelf: 15⅛″w, 13½″h, 19¼″d

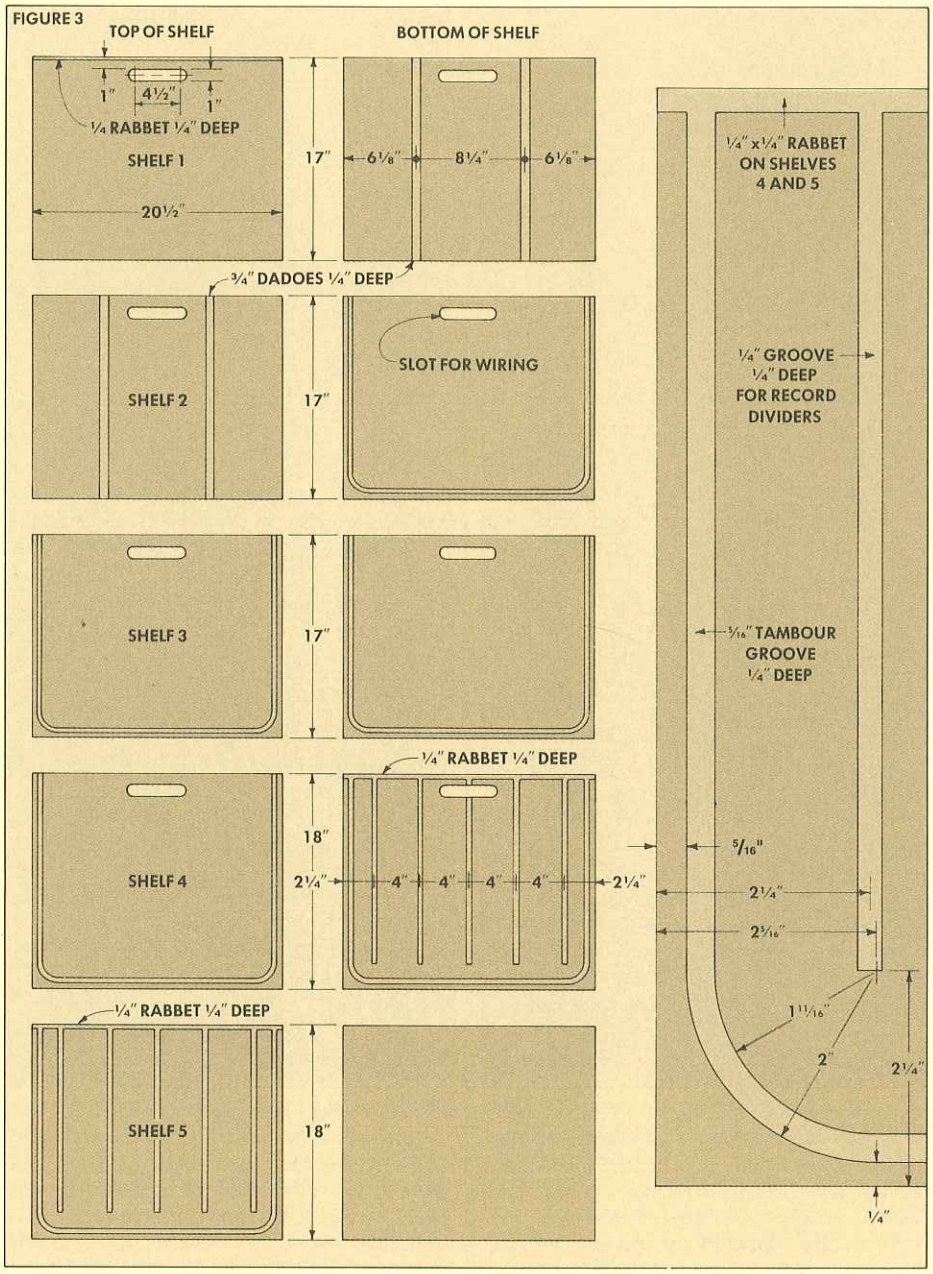
BUILDING THE CASE

The first step is to cut all the pieces for the cabinet to finished size. This is really just a matter of ripping two 18″-wide pieces off the sheet of plywood, and then cutting the sides and shelves to length.

As I cut off the pieces for the shelves, I numbered them to keep everything straight. The shelves are numbered from 1 (top) to 5 (bottom). Shelves 1, 2, and 3 are cut short to allow space for the top tambour as it's rolled back.







There's enough room on the Cutting Diagram to cut four of the shelves as solid pieces. But you need five shelves. I got the extra shelf by cutting two pieces from the scrap and gluing them together. (There's very little strain on this shelf, so a plain butt joint will work.) This glued-up shelf was used as Shelf 2.

ROUTING THE GROOVES

All of these shelves, plus the two sides, require two basic kinds of grooves: ¾"-wide dadoes for holding all the pieces together, and the 5/16"-wide C-shaped tambour grooves.

THE DADOES. The best approach is to cut all the ¾"-wide dadoes for the shelves first. (I did this with a router.) Then go ahead and cut the dadoes in Shelves 1 and 2 for the drawer dividers. Now the sides and shelves can be dry-assembled.

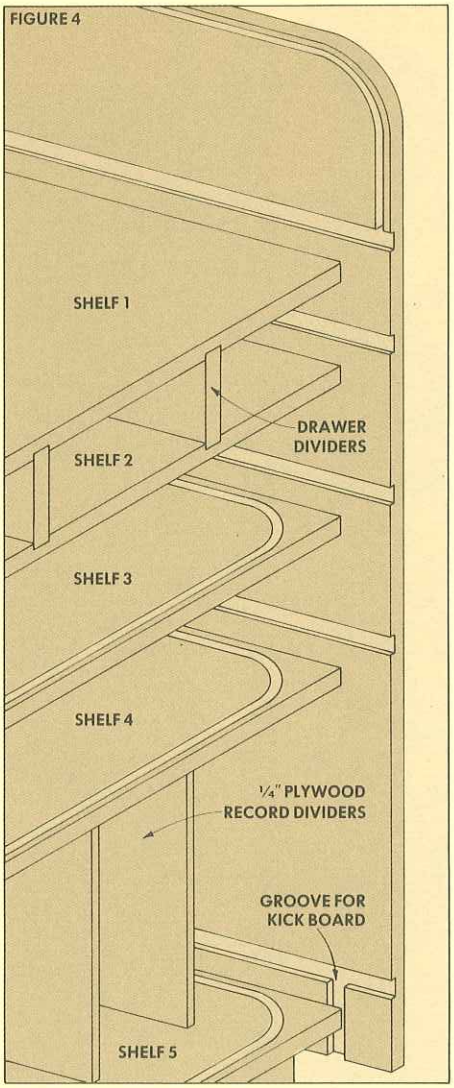
The reason for dry-assemblying now is to mark the actual depth of the dadoes on the shelves. The tambour grooves are cut so there's only 1/16" space between the outside of the tambour groove and the sides of the cabinet. So you must know the depth of the dadoes before you can properly position the tambour grooves.

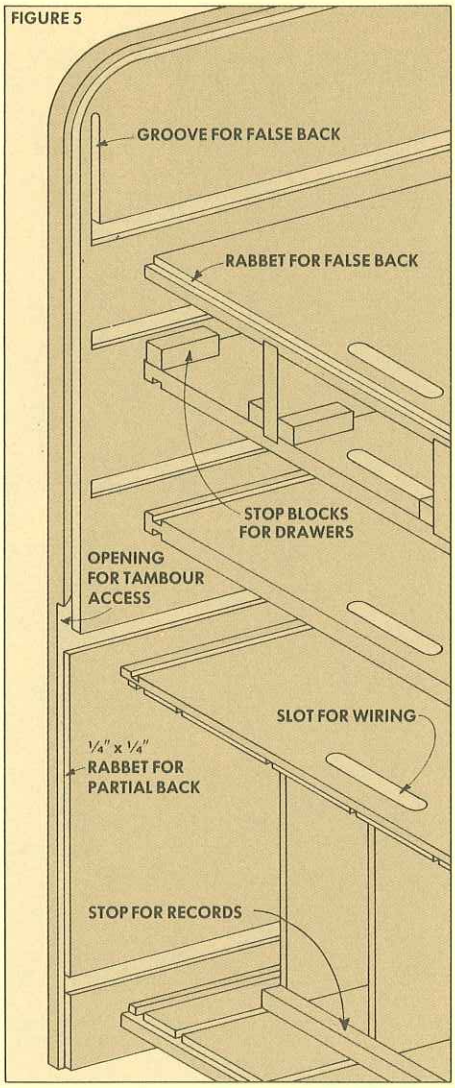
TAMBOUR GROOVES. In addition to marking the shelves 1 through 5, I also marked the 'top' and 'bottom' of each shelf. Things can get more than a little confusing at this point. In Fig. 3 we've sketched the position of the tambour grooves, the ¾" grooves for the drawer dividers, and the ¼" grooves for the album dividers.

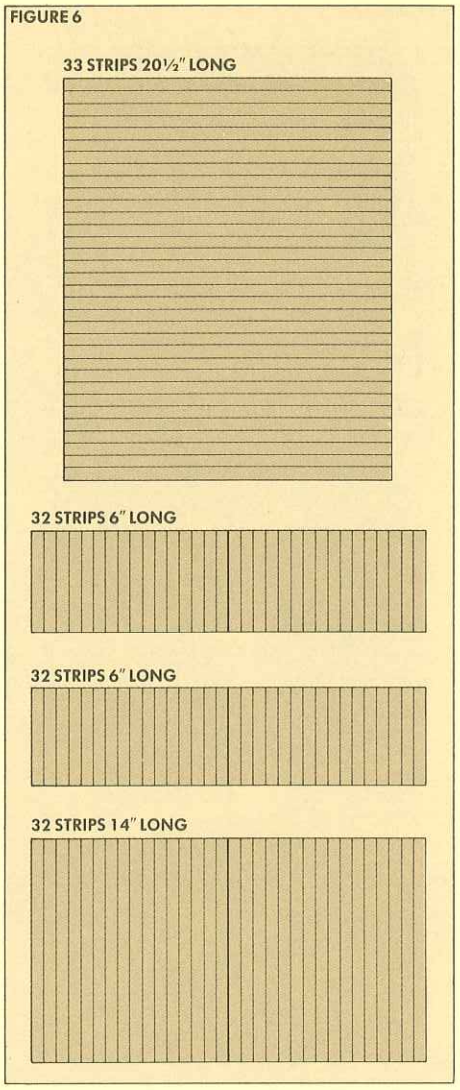
The only difficult part about cutting the tambour grooves is the radius cuts at the corners. The way I did it on this project is to use a *Sears* router guide with the trammel point attachment to cut all the radius corners first. After the corners were routed, I went back and made all the straight line cuts to connect the corners. All of these grooves are 5/16" wide, ¼" deep. (I don't think *Sears* sells 5/16" straight bit. I used a *Stanley* 5/16" bit.)

Tambour grooves must also be cut in the sides of the cabinet for the top tambour, Fig. 2. These grooves are exactly the same as the shelves, except the rounded corners are cut at a 2 7/16" radius. Also, Fig. 4 shows how this groove extends about halfway down the back to the Shelf 4.

OTHER STUFF. Aside from the dadoes and the tambour grooves there are a few other little things to clean up. I cut grooves for a false back to be inserted at the back of the Shelf 1, see Fig. 4. This is just to pre-







vent the back of the tambour from showing when it's raised. Also, rabbets are routed to accept a partial back behind the album storage area. (There's no back on the other shelves so it's easier to get to all the wiring.) Finally, slots are cut toward the back of each shelf to run wires to and from the components.

THE TAMBOURS

Now, once again dry assemble the cabinet so you can get the approximate measurements for the tambours.

All of the step-by-step involved in making the tambours is discussed on page 4. Basically, it's just a matter of getting a bunch of 3½"-wide boards and cutting a whole lot of tambour strips. (I used quarter sawn Red Gum for the tambours.)

All of the tambour strips are cut ¼" thick and ¾" wide. As for length, I combined some of the tambours to simplify things for the edge-rounding step. I needed 33 strips for the top tambour, but cut 40 strips 21" long to allow for warped strips. (The 21" length is approximately ½" longer than needed. I trimmed the tambour to size after the canvas backing was glued on.)

I also cut 48 strips (to yield 32 good ones) 13" long for the two shelf doors. These were then cut in half *after* rounding the edges to yield 16 strips for each of the four small tambours. And finally, there are 40 strips (to yield 32 good ones) 14½" long for the album storage doors. (One extra backing strip is also needed on each of the seven tambours. These can be waste pieces.)

All of these strips are then glued up to make the tambours, as discussed in the article on page 4. However, when gluing the canvas backing on the three tambour doors (for the bottom three shelves), I glued-up each tambour as one long piece, Fig. 6. Then I cut the canvas at the center to get the right and left doors.

Now, with the cabinet dry-clamped together you can get the final measurements for the tambours, and trim them about 1/16" less than the groove to groove distance.

Insert all the tambours and test their fit and movement (who could resist at this point). They probably won't slide very smoothly, but that will be taken care of later (when the finish is applied). The key thing is to make sure the tambours don't get hung up anywhere in any of the grooves.

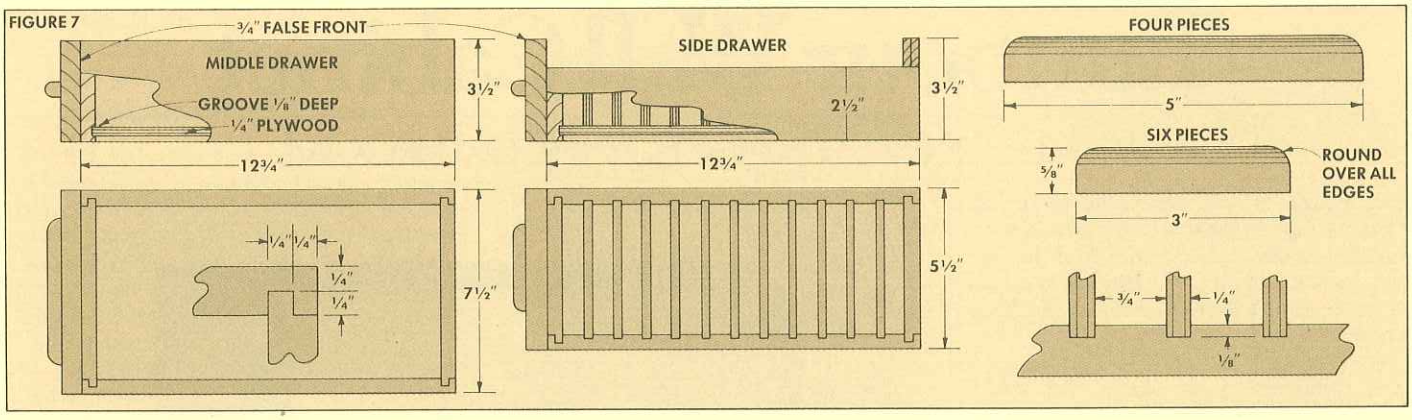
GLUE-UP THE CABINET

When you're fairly certain the tambour grooves are in good shape, the cabinet can be glued up. This requires a small fortune in pipe clamps, one at each shelf, front and back, 10 in all. As I applied pressure to the clamps, I constantly checked the square of the cabinet.

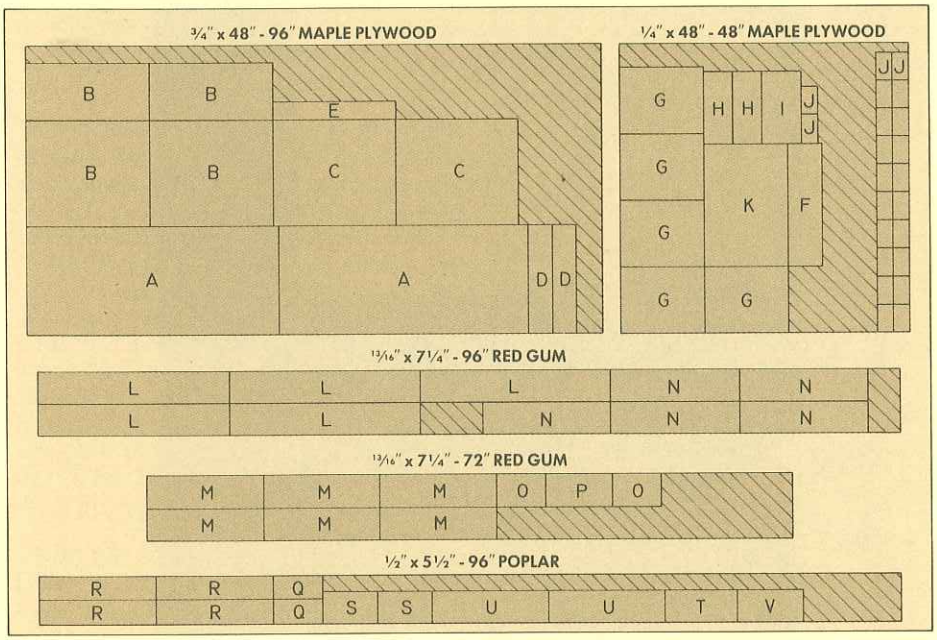
After the glue was dry, I covered all of the plywood edges with *Craftwood Real Wood* veneer tape. (This is an iron-on tape that is very good quality. Unfortunately, I don't know of a mail-order source — I bought it at a local lumber yard so it should be available nationwide.)

THE DRAWERS

The one thing I haven't mentioned so far is the drawers. At first we weren't going to have any drawers in this cabinet. In fact it wasn't until after I built one complete cabinet (of slightly different design) that



CUTTING DIAGRAM



MATERIALS LIST

Overall Dimensions: 42"h x 21½"w - 18"d		
A	Sides	(2) ¾ x 18 - 42
B	Top Shelves	(3) ¾ x 17 - 20½
C	Btm. Shelves	(2) ¾ x 18 - 20½
D	Dwr. Dividers	(2) ¾ x 4 - 17
E	Toe Board	(1) ¾ x 3 - 20½
F	False Back	(1) ⅛ x 5½ - 20½
G	Dividers	(5) ¼ x 14 - 11
H	Drawer Bottom	(2) ¼ x 4¾ - 12
I	Drawer Bottom	(1) ¼ x 6¾ - 12
J	Drw. Dividers	(22) ¼ x 4¾ - 2¼
K	Back	(1) ¼ x 20½ - 14
L	Tambour	(33) ¼ x ¾ - 20½
M	Tambour	(64) ¼ x ¾ - 6
N	Tambour	(32) ¼ x ¾ - 14
O	False Drw.	(2) 13/16 x 3½ - 5½
P	False Drw.	(1) 13/16 x 3½ - 7½
Q	Drw. Fronts	(2) ½ x 2½ - 5½
R	Drw. Sides	(4) ½ x 2½ - 12¾
S	Drw. Backs	(2) ½ x 2½ - 5½
T	Drw. Front	(1) ½ x 2½ - 7½
U	Drw. Sides	(2) ½ x 2½ - 12¾
V	Drw. Back	(1) ½ x 3½ - 7½

we decided to add the drawers.

The drawers really serve two purposes. The obvious one is to hold cassettes and other stuff that seems to gather around any stereo equipment. The other reason was mostly a matter of design. Ted and I felt we needed a transition between the horizontal top tambour and the vertical bottom tambours. Hence, the drawers were added.

As shown in Fig. 7, the drawers are fairly basic construction — rabbet and groove joinery. (This joinery technique is shown in *Woodsmith* Number Six.) A series of dadoes was cut in the sides of the two cassette drawers for ¼" plywood dividers.

After the basic drawers were built, I added a false front to each drawer. These fronts were cut from one length of Red Gum so there would be a continuation of the grain pattern.

Finally, I made the handles for the drawers and tambours. The dimensions for the handles are shown in Fig. 7. (Rounding-over of the edges can be done on a router table, but it's a hazardous procedure. It's probably better to get the round edge by filing the sanding.)

The handles can be glued to the drawer; but the handles on the tambours are fastened *after* the finish is applied. To mount the handles on the tambours, drill pilot holes through the tambour and the backing strip. Then drive No. 6 x 1" screws so the tip just barely pokes through the front of the tambour. Position the handle and press it on the tips of the screws to mark the position of the holes. Then drill the pilot holes in the handles.

To fasten the handles to the tambour, slide the tambour into the grooves in the cabinet. Then hold the handle in place with one hand and drive the screws home by reaching around behind and through the back of the cabinet with the other hand. (Caution: Don't try this with a hang-over; you'll never get yourself uncurled.)

FINISHING

Applying a finish to this cabinet can present some problems. The tambour grooves and the spaces between the tambour strips are havens for any kind of thick finish which will get things all clogged up.

I felt the best finish would be a greatly thinned down solution of white shellac. I started with a can of 3lb.-cut white shellac and thinned it 1:2 with solvent alcohol. (Mixing one cup of shellac with two cups of solvent alcohol.)

Shop Note: Most shellac sold today is 3lb.-cut. This means three pounds of shellac flakes are added to one gallon of solvent alcohol. The can should say what 'cut' the shellac is, and also give a 'use before' date. Check the date before you buy.

By thinning down the shellac as described above you have, in effect, 1lb.-cut shellac. This is very easy to apply (I used one of those new poly-foam brushes). The first coat will be dry enough to sand (with 320 silicon carbide 'wet-dry' sandpaper) in about 20 minutes. I applied a total of four coats to the cabinet and the tambours, sanding between coats. Then I finished it off with a coat of furniture wax.

The one nice thing about shellac is that it's very hard. It will seal the grain in the tambour grooves very well, and you'll be amazed at how easily the tambours move.

Tambour Wall Cabinet

WALL-HUNG STORAGE FOR THE BATHROOM

A tambour is just a fancy sliding door. But it's surrounded with mystique. How does it work? How do you build one? And the biggest question of all: Do I have to build an entire desk just to build something with a tambour?

Well, I truly enjoy building projects with tambours. And that's the whole reason behind this bathroom cabinet. It's a simple, back-to-basics cabinet that offers an excellent (and easy) opportunity to try your hand at building a tambour.

BUILDING THE CABINET

The basic cabinet is built from one 1x10 board 8′ long (I used redwood). I started by cutting the two sides to length and trimming them to a 9″ width. Most of the work involved in building this cabinet is done on these two side pieces.

THE TAMBOUR GROOVES. The door of this cabinet is one long tambour that follows a C-shaped path. We put most of the details for routing the tambour groove (and making the tambour) on page 4.

But basically, you need to cut a 5/16″-wide groove along the front edge, across the top, and then down the back. To do this I used a *Sears* router with the new *Sears* No. 25179 Multi-purpose Edge Guide with the trammel point attachment. The rounded corners should be cut first, and then the straight line cuts can be made to meet the radius cuts.

Before actually starting the routing, I found it helpful to draw the outline of the tambour groove on the wood. The placement of the two radius arcs is critical because they force the placement of the straight line cuts and also the rabbet on the back edge.

The front radius arc must leave a ¼″ lip between the *outside* edge of the tambour groove and both the front and top edge of the side piece. The back arc must leave a ¾″ lip on the back edge for the rabbet, and a ¼″ lip on the top edge.

Shop Note: Make sure the arc starts and stops exactly where the straight-line cuts will meet it. I drew perpendicular lines from the pivot point to the edge, and stopped the cut when the router bit was centered on these lines.

After the two radius corners are cut, I used the *Sears* edge guide to make the straight line cuts. When setting the edge guide for these cuts place the router bit in the end of the radius cut and adjust the edge guide fence tight against the edge of the board. Then I routed the straight-line grooves along the front, top, and back edges. Also, there's a 5/16″-wide groove along the bottom edge. This is not actually part of the tambour groove; it's part of the joint to hold the bottom in place, but can be cut now.

GROOVE FOR FALSE BACK. After the tambour groove is cut, switch to a ¼″ bit and cut the groove for the false back. This groove should be ¼″ to the inside of the tambour groove, see Fig. 2. A ¼″ plywood false back is inserted in this groove to prevent stuff inside the cabinet from interfering with the movement of the tambour.

RABBET. There's a ¾″-deep, ½″ wide rabbet on the back edge of both sides. This rabbet accommodates the ¼″ plywood back. It should be cut so it just skims along the outside edge of the tambour groove.

HOLES FOR SHELF SUPPORTS. I drilled a series of holes in the sides to accept the small metal shelf supports. This method of mounting allows for easy adjustment of the position of the shelves.

THE TOP AND BOTTOM

The top and bottom pieces are joined to the sides with simple rabbet joints. However, there are differences between the two.

The top piece is ripped down to meet the curves on the side pieces. Then, both ends and the front edge are rounded-over. Rabbets are cut so the shoulder of the rabbet butts up against the ¼″ lip above the tambour groove, see Fig. 3. (Make sure the top piece doesn't extend down into the tambour groove and interfere with the movement of the tambour.)

The bottom piece is joined to the sides by cutting a rabbet on both ends. However, the purpose of this rabbet is to leave a 5/16″-thick tongue. The chief concern here is to cut the shoulder of this rabbet the same

as the shoulder on the top piece so the sides will be parallel. The tongue can then be trimmed to fit the depth of the groove.

GLUING UP THE CABINET

The four sides can now be glued up, using at least four pipe clamps. The one thing to remember is to insert the false back as you're assembling the case. This back need not be glued into its groove (there's really nowhere for it to go), but it's easy to forget it's supposed to be there.

After the cabinet is glued up, it needs a ¼" plywood back. This back is important for two reasons. First it holds the tambour in the groove on the back edge. Also, the mounting bars are fastened to it so the cabinet can be wall-hung. These bars are 1x2s bevel ripped at 20°, see Fig. 5.

THE TAMBOUR

The tambour for this cabinet is quite easy to make. All of the construction details are given on page 4. However, instead of going through all the effort of cutting the tambour strips, I took a shortcut. The tambour shown here is made of screen bead.

Screen bead is (or should be) a standard molding available at almost any lumber yard. To make this tambour I used 41 strips 15½" long, plus one backing strip. After the cabinet was glued up I got the final measurements for the tambour (1/16" less than the groove to groove measurement), trimmed it, and tested it out.

FINISHING

I built this cabinet as extra storage in the bathroom (it hangs on the wall above the toilet tank). Since it will be exposed to high moisture and water drops, I finished it with *Defthane* Satin No. 2. For the cabinet I applied *Defthane* with a brush, but on the tambour I used a spray can of *Defthane*, applying light coats so the strips didn't stick together.

CUTTING DIAGRAM

Overall Dimensions: 24"h x 18"w x 9"d

A	Sides	(2) 11/16 x 9 - 24
B	Top	(1) 11/16 x 6½ - 16
C	Bottom	(1) 11/16 x 8¼ - 15⅛
D	Shelves	(2) ¾ x 6 - 14½
E	False Back	(1) ¼ x 15⅛ - 20¾
F	Back	(1) ¼ x 15¾ - 24
G	Tambour Strips	(41) ¼ x ¾ - 15½

FIGURE 1

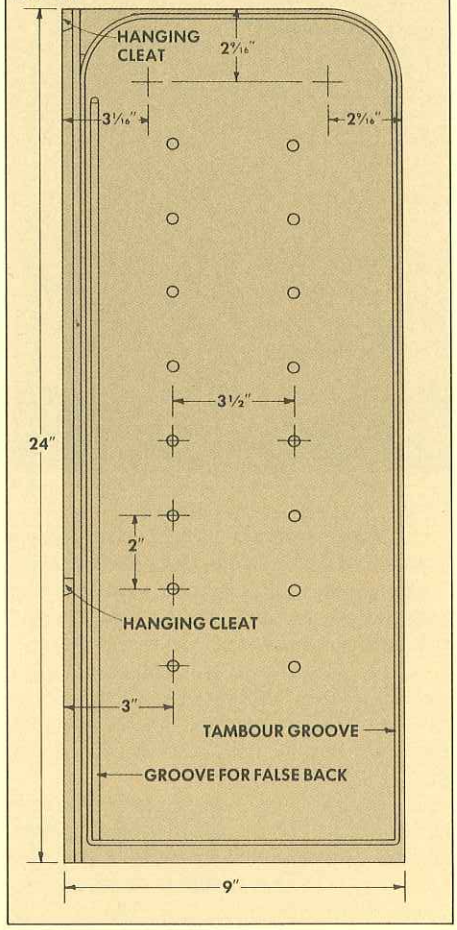


FIGURE 2

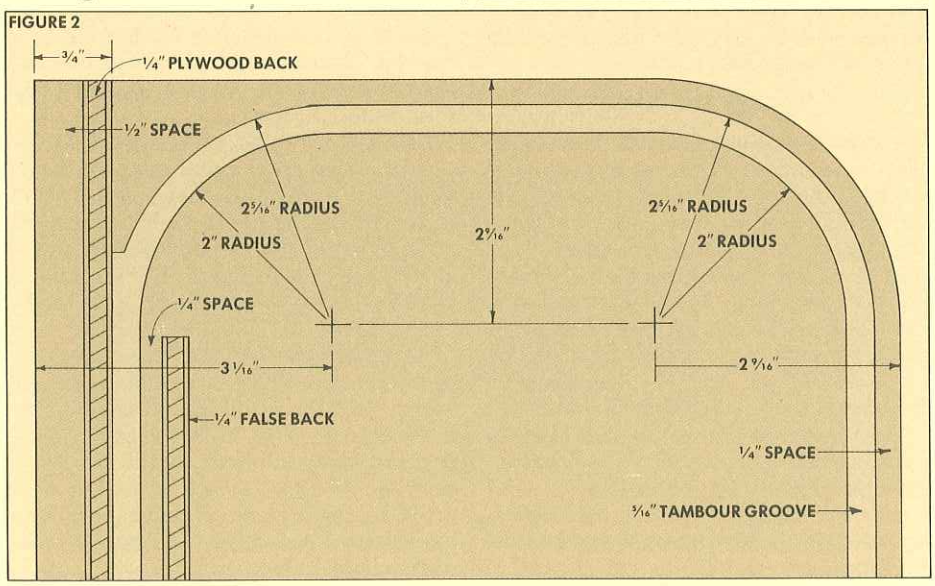


FIGURE 3

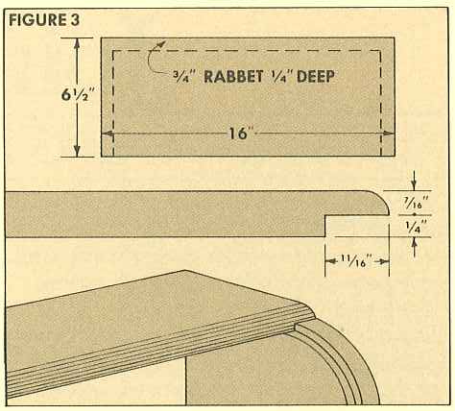


FIGURE 4

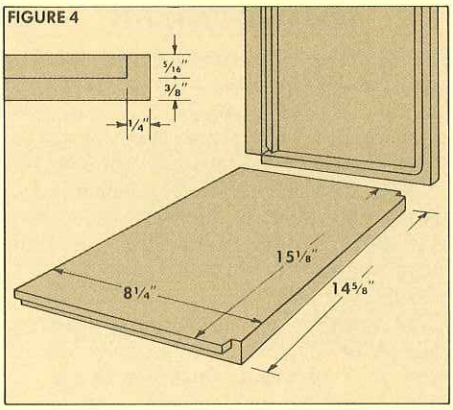


FIGURE 5

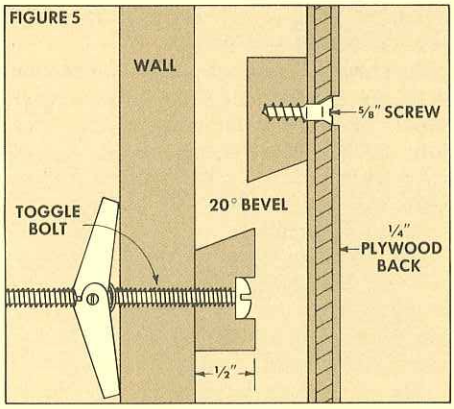
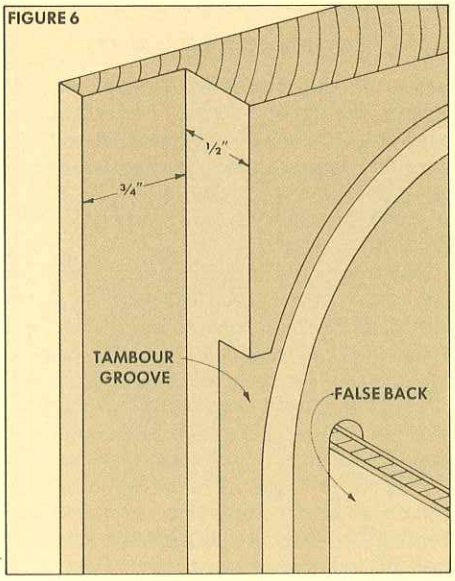


FIGURE 6



Joinery: Box Joint

DEALING WITH THE DOVETAIL'S POOR COUSIN

A box joint is often thought of as the poor cousin of the dovetail. That's unfortunate because it's really quite a handsome joint that's both decorative and quite strong.

Once this joint is cut (if it's cut well) it takes only a little glue to make an extremely strong joint. That makes it particularly nice for drawers, and of course, boxes.

THREE REQUIREMENTS

Now that I've come to the defense of this joint, I should mention a few of its better qualities. It's quite easy to cut a box joint on a table saw (if you have the patience to set up the cutting jig).

There are three basic requirements for cutting a box joint: 1) a simple, but accurately aligned jig or cutting fence, 2) a miter gauge designed to hold the fence, and 3) a good dado blade.

The fence (or jig) for cutting a box joint couldn't be simpler. It's basically just a piece of ¾" plywood, as shown in Fig. 1. (More about this cutting fence later.) The important thing is you need a miter gauge that will accept this fence.

Most miter gauges have holes for attaching jigs of this type. (The recent models of *Sears* miter gauges have nice slots molded into the top edge.) If your miter gauge doesn't have these holes, you'll have to bore two ¼" holes so the fence can be attached.

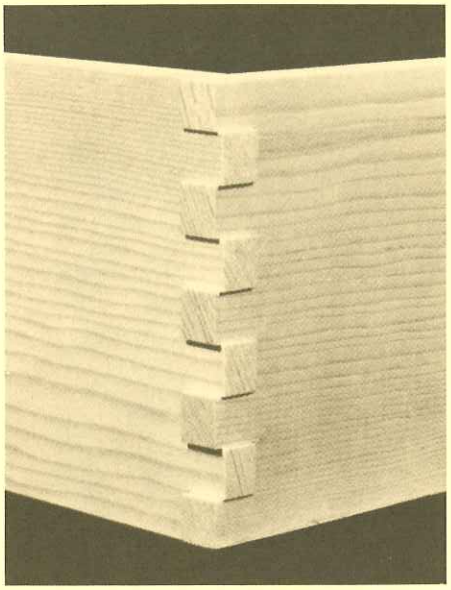
The third requirement mentioned above is a good dado blade. One of the best dado blades we've found also happens to be excellent for cutting box joints. It's the *Freud* AD-600 Adjustable Dado. (This is discussed in more detail in Talking Shop, page 20.)

LAYING OUT THE JOINT

Before cutting the joint (in fact, before making the cutting fence), some thought must be given to the final appearance of the joint. The joint shown in the photo above is the most basic approach to cutting this joint. The wood is ¾" thick, and each 'pin' and 'slot' is ¾" x ¾".

The width of workpieces used with a box joint must be considered ahead of time. The ideal situation is a workpiece that's an odd multiple of the height of each pin, plus a little extra for trim. In other words, if a ¾" x ¾" box joint is going to be cut, the width of the workpiece should be 3 times, 5 times, 7 times ¾", plus a little extra.

This odd multiple will yield a joint with a pin at the very top and very bottom of the joint. If it's an even multiple, there will be a pin on top and a slot on the bottom, and



the joint will look unbalanced.

The 'little extra' mentioned above allows for some flexibility when cutting the joint. For example, a ¾" x ¾" box joint is cut in some drawer fronts and sides that are 9¾" wide (9¾" is 13 times ¾", an odd multiple). If each cut is off just 1/64", the cumulative result is over 3/16" off by the time you get to the last cut. By leaving this little extra width, you can alter the last cut to compensate for this fractional cut.

If you don't want the square 'checkerboard' look at the corners, there are other options. You can cut the joint ½" x ¾", ⅜" x ¾", or any other set of dimensions, as long as one of them is ¾" (the thickness of the workpiece.) When the pins are extremely narrow, say ⅛" x ¾", the joint is usually referred to as a finger joint.

CUTTING THE JOINT

The step-by-step procedure for cutting the joint is described on the next page. The crucial thing here is making the cutting fence. If it's cut and mounted properly, everything else just falls into place.

I use ¾" plywood of about the dimensions shown in Fig. 1 to make this fence. Plywood is really best because there are no problems with warp, and the little section between the pin and the 'cut hole' is stronger in plywood than solid wood.

First I set the width of the dado blade to the width of the pin I need. (The drawings show the dimensions for cutting ¾" x ¾" pins as an example.) The first cut (for the key) is made about 6" from the right end of the fence. It's best if this cut is not full depth — about ⅝" rather than ¾".

Now a hardwood key (pin) is cut to fit this first notch. Accuracy here is essential. The key must be exactly as wide as the notch. It may take several attempts to get it right, but this will save many headaches later.

The key need only be about 1½" long, but make it longer so you can use a small waste section to align the 'cut hole.' Line up the cutting fence as shown in Fig. 2, using the waste section of the key. Then clamp the fence to the miter gauge, and mark the position of the pilot holes for the screws. Remove the fence and drill the pilot holes and then fasten it to the miter gauge with round head screws, Fig. 3.

To align the fence, make a trial cut, just barely knicking the bottom edge of the fence. Now, carefully check the spacing. The space between the key and the 'cut hole' should be exactly the same as: 1) the width of the key, and 2) the width of the 'cut hole.' If not, make a small adjustment until it's right on.

If you're working with ¾" wood, adjust the height of the blade so it's just a smidgen over ¾" high. (This will make the pins slightly long as shown in the photo above.) Now you're ready to cut the joint.

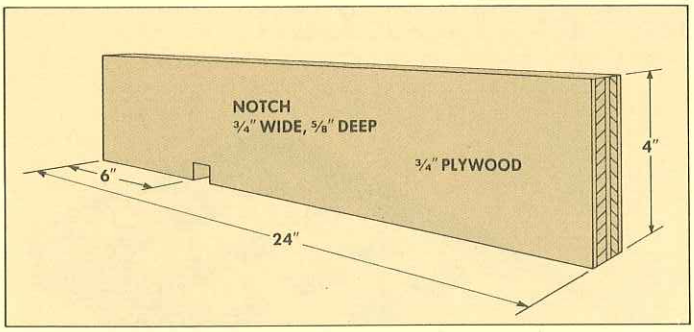
Most books show cutting this joint in two boards at once. I used to do it this way but changed to the method shown here. (I feel it's more accurate, and there's less confusion with this method.)

Position one board up against the pin (Fig. 5) to make the first cut. This board will, of course, have a full pin on the top edge (it's usually the front piece on a drawer). Make the first cut and then lift the board and place the notch you just cut over the key. Then make all succeeding cuts the same way (Fig. 6), leaving the last pin a little wide, as shown.

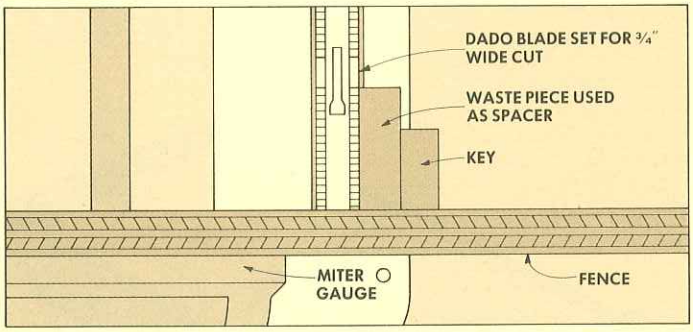
The first cut on the second board will be a notch. This notch must mate precisely with the top pin on the first board. If both boards are cut at the same time, this cut must be eye-balled, which is always a guess at best. I've found the best way to align this cut is to use the first pin in the first board.

Simply flip the first board around so the first pin is between the key and the second board. Push the second board up tight and make the cut, Fig. 7. This should yield a perfectly matched notch for the pin. Now, continue to cut, leaving an extra-wide notch on the last cut. Finally, trim both board to width, and you should have a perfectly matched box joint.

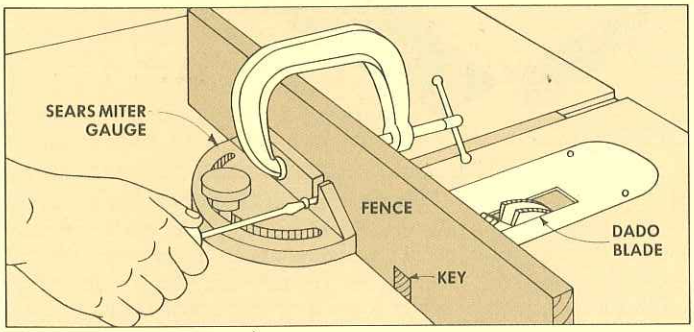
Step-By-Step



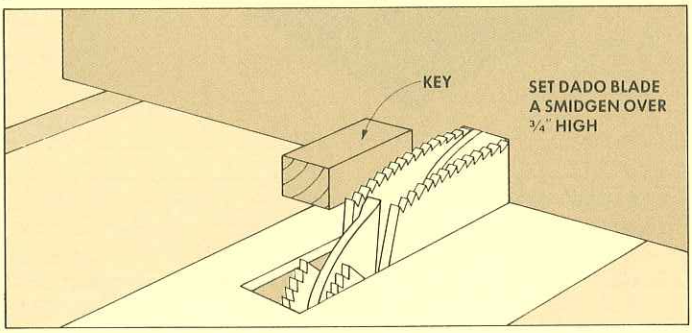
1 *First, cut a piece of ¾" plywood to size for the fence. Clamp it to miter gauge and cut notch for key. Notch should be exactly as wide as the box joint pins, but can be about ⅛" shorter in height.*



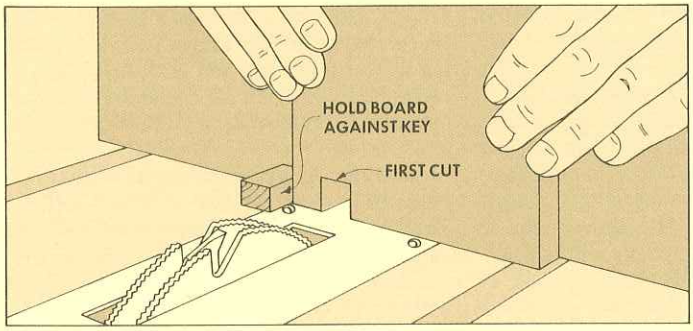
2 *Cut a hardwood key to fit in the notch. This key should be exactly as wide as the pins for box joint. To position fence, place a waste piece between the key and dado blade.*



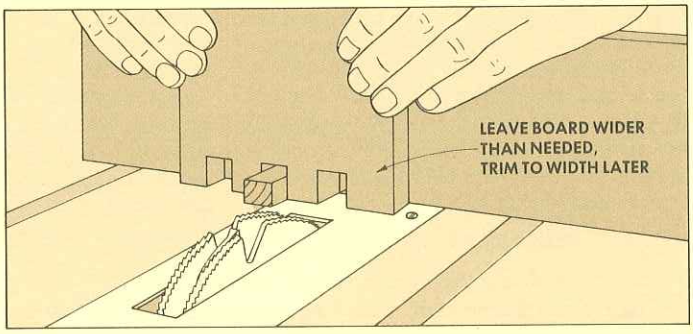
3 *Miter gauge should have slots for attaching the fence. If not bore ¼" holes. Mark position of pilot holes on back of fence, remove and drill pilot holes, then attach with round-head screws.*



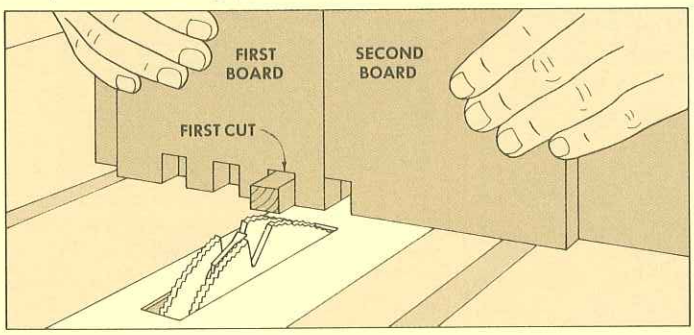
4 *To check alignment of fence, just barely nick the front edge of the fence. Width of key, width of 'nick,' and distance between the two should all be exactly equal. Make cut slightly over ¾" high.*



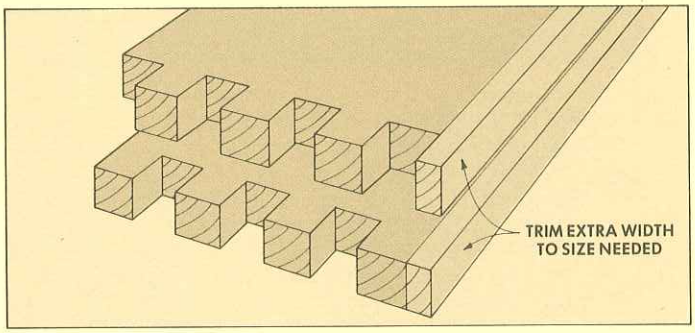
5 *To make first cut, slide board up against the key. Make sure it's vertical, then push it through the dado blade. It's best to do all of this on a scrap piece so you can once again check the cut.*



6 *After first cut, lift board and place notch over key. Then just keep cutting. The board should be cut wider than needed (exaggerated in drawing). Leave last pin a little wide; trim later.*



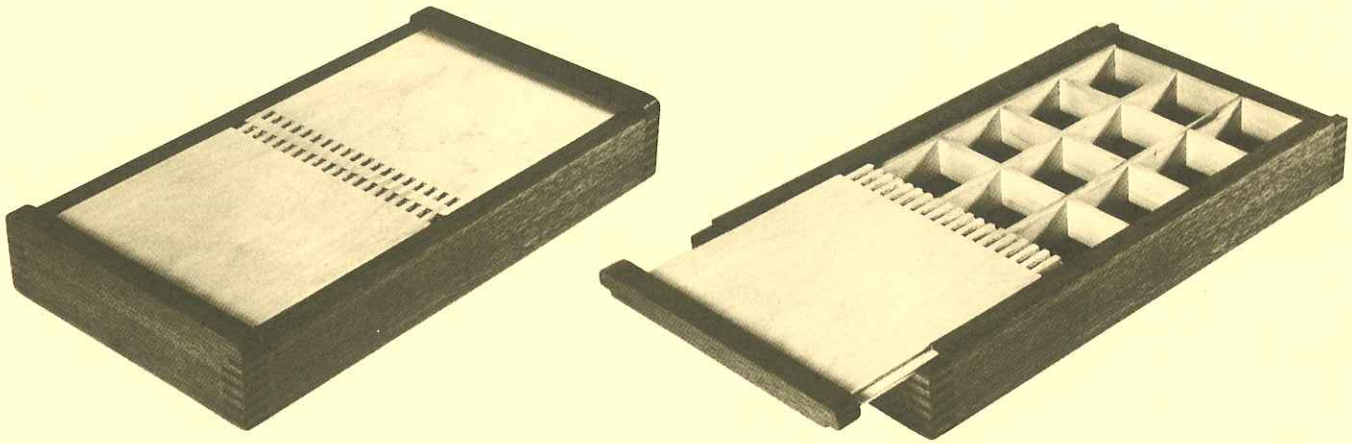
7 *Use the first pin in the first board to align second board. Hold second board firmly against first, then make notch cut. Continue making cuts as before, leaving waste after last cut.*



8 *The two boards should now have perfectly matched box joints. All that remains is to trim the waste off both boards. The bottom joint may be a little wider or narrower than the rest.*

Slide-Top Box

ONE BOX . . . THREE USES FOR THE FINGER JOINT



I will admit that most of the projects we design are based on a particular woodworking technique. This slide-top box may take that premise to an extreme. The technique we wanted to work with is the finger joint. After several experiments, Ted came up with this jewelry box.

I won't even try to be shy about how I feel about this little box . . . I think it's fantastic. Why? The way it's built, and the way it works. The four sides are joined with finger joints. The sliding lids are extensions of the finger joint. The two lids lock in the center with another finger joint arrangement. And finally, the 'egg crate' arrangement on the inside of the box is cut on the same jig as the finger joint.

BUILDING THE BOX

The key to building this box is, of course, the jig for the finger joint. Since a finger joint is really just a skinny box joint, the jig (or fence) is like the one on page 12.

THE FOUR SIDES. Before making the jig, the four sides must be cut. (We used some small scraps of mahogany for the sides.) All four sides are ½" thick. We got this thickness by resawing some ¾" stock. (Resawing in this case is simply a matter of turning the sticks on edge and ripping them down.) The finished dimensions of the long sides (the front and back) are 1⅝" wide by 10⅞" long. The end pieces are only 1⅜" wide by 6" long, Fig. 1.

Now that I've given these dimensions, I have to say that they may or may not be correct. It all depends on the blade you use to cut the finger joints. These dimensions are based on ⅛"-thick pins on the finger joints. If the blade you use cuts a wider or narrower kerf, the dimensions will change. This doesn't change the way the box is made, it simply means that you go by the actual cuts instead of some measurement.

Shop Note: One of the best blades to use for these cuts is a rip blade. First, because most rip blades will cut a kerf very close to ⅛"; second because the finger joint cut is really a rip cut; and third because a rip blade will leave a flat bottom.

Getting back to the business at hand: the pieces for the four sides should be cut about 2" wide at first. Then after the finger joints are cut, the long pieces are ripped down so there are six fingers and seven slots (leaving a slot on the top and bottom). The end pieces are trimmed so there are five fingers and four slots (a pin on the bottom and a slot on the top).

GROOVES. After trimming the four sides, grooves are cut for the plywood bottom. The grooves on the long pieces will slice off part of one pin, leaving a gap when the side are assembled, Fig. 1. This gap is filled with putty later.

The grooves on the end pieces are no

FIGURE 1

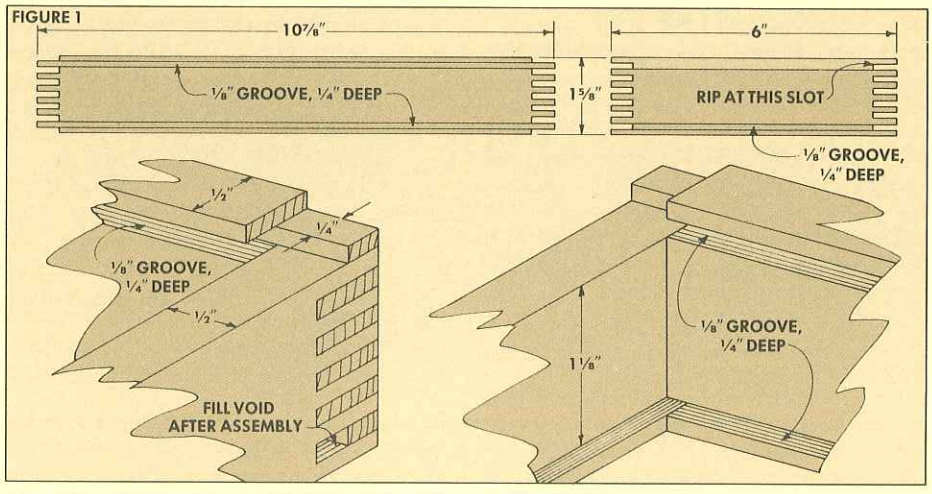
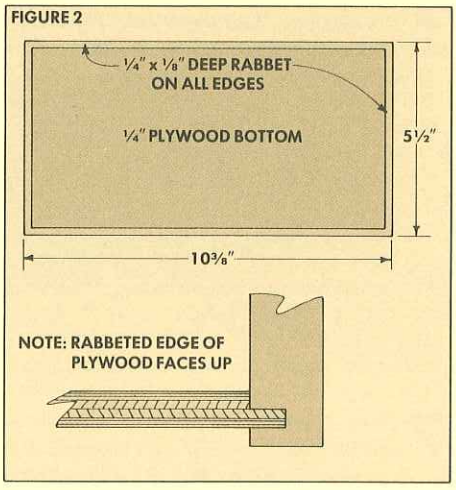


FIGURE 2



problem because they start and stop on a notch. While you're at it, go ahead and cut the grooves for the sliding lids on the top edge of the long pieces. Needless to say, alignment of these cuts must be precise.

PLYWOOD BOTTOM. Before assembly, a ¼" plywood bottom is cut to fit in the grooves. As shown in Figure 2, rabbets are cut on all four edges of what will be the inside face of the bottom.

Shop Note: We used Baltic birch plywood for this bottom (and also for the lids). This type of plywood is usually found in hobby stores that sell supplies for building model airplanes. It's available in ⅛", 3/16", and ¼" thicknesses. It's quite expensive, but worth it.

THE SLIDING TOP

Once the sides are assembled (with the bottom in place), a piece of plywood can be roughed out for the sliding lids. The final width of the lids is shown as 5½", but the plywood is actually cut a little wider than the distance between the two grooves and trimmed later. Also, it should be cut at least 1" longer than the assembled box. After cutting the plywood to rough size, cut it in half to yield the two pieces for the sliding lids.

THE FINGER LOCK. Now the finger joint 'lock' can be cut on these two pieces, Fig. 4. I think this is really kind of a classy lock. The pins just barely overlap (enough to create a little friction), yet hold the lids together quite nicely.

The same set-up used to cut the finger joints is used to make these cuts — yielding ⅛" x ½" interlocking 'fingers.' If you're extremely lucky, everything will work out so these fingers to fit evenly between the sides. If not, you just have to fudge a little when cutting rabbets.

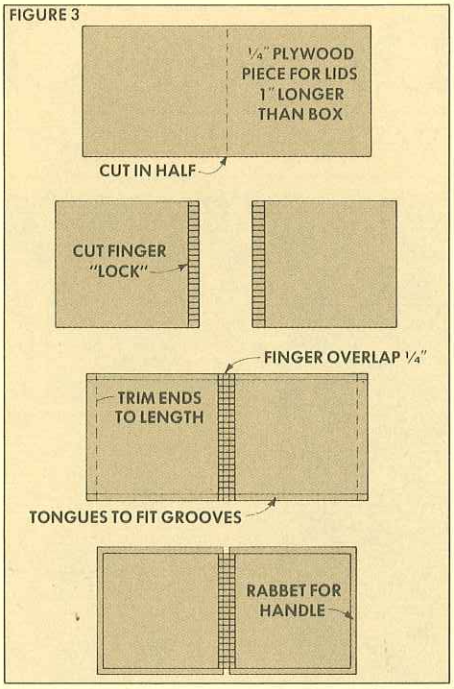
MITERING THE PINS. The ends of each pin are mitered at a 45° angle. This makes it easier for the two lids to mesh as they're closed. We mitered the pins with a sharp chisel — just one medium whack should do the job.

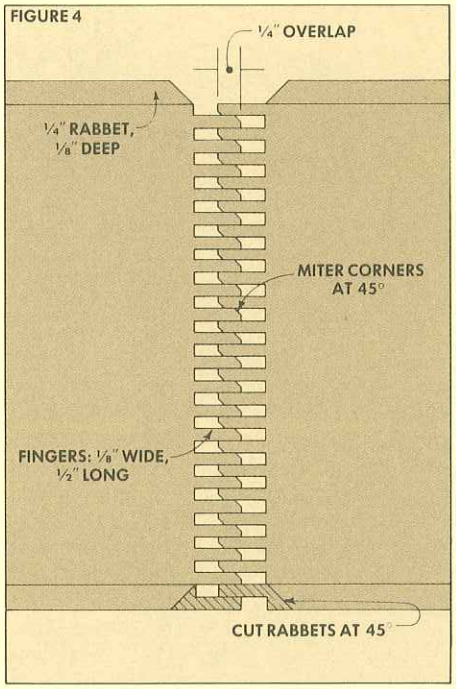
CUTTING THE RABBETS. Now, rabbets can be cut on the outside edges of the plywood pieces. Since the plywood pieces are wider than needed, there's a little latitude in the placement of the rabbets.

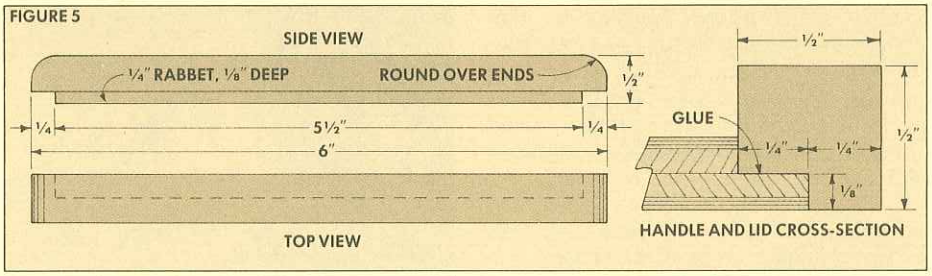
The real purpose of the rabbets is to form a tongue (to slide in the groove in the long sides) and a shoulder (which should fit fairly tight against the sides). However, this is where you may have to fudge a little, working around the fingers for the 'lock.'

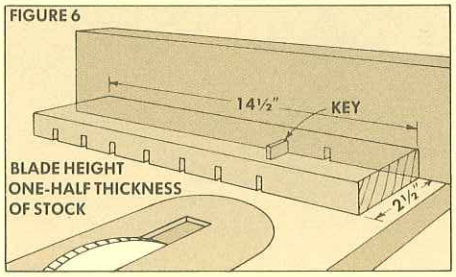
After the rabbets (tongues) are cut, slide the lids in the box. Push the two lids together so the fingers overlap ¼" (leaving a pattern of ¼" spaces). Now, measure in ¼" from each end, and trim the lids to length as shown in Fig. 3. (This ¼" space leaves room for the handle.)

HANDLES. The handles start out ½" x ½" square sticks, about 6" long. The handles are joined to the lids with double rabbet cuts. As with everything else on this project, one cut depends on another. As shown in Fig. 5, matching rabbets are cut in the handles and the lids — cut one, and then cutting the other to fit.







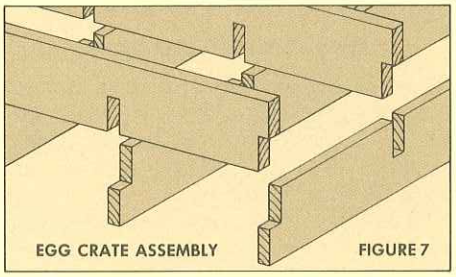


THE EGG CRATE

At this point you should have a very nice little box with sliding lids. We went a step further and made an 'egg crate' divider system for the inside of the box for storing earrings, jewelry, or very small eggs.

The same fence used for cutting the finger joints is used to cut the half-lap joint on the 'egg crate.' The fence is repositioned so there's a 1½" space between the key and the blade, Fig. 6.

Set the height of the blade at one-half the thickness of the wood you're using. (We used 13/16" maple.) The board is laid flat on the saw and a series of slots is cut just like you were cutting a box joint. Then rip slices off the edge of the board so they're as thick as the saw kerfs. These pieces should fit neatly together to form the 'egg crate,' Fig. 7.



FINISHING. We finished the box with three coats of thinned-down shellac. (One-quarter cup of 3lb.-cut shellac was thinned with one-half cup of solvent alcohol.)

Shop Note: The gaps left by cutting the groove for the bottom (mentioned earlier) can be filled with a shop-made mixture of shellac and sawdust. A few drops of shellac are added to a small pile of sawdust to make a 'putty.'

The entire box was given a coat of furniture wax, particularly in the grooves and between the fingers on the lid. Finally, the bottom was lined with some black felt.

Six-Drawer Chest

CONTEMPORARY CHEST WITH BOX JOINT DRAWERS

In recent years the trend in contemporary furniture has been toward clean uncluttered lines. No frills, no fancy curves. Just good basic design. Simple, you might say, yet I think quite attractive.

This Six-Drawer Chest was designed from that standpoint. It's made of clear pine, and sealed with a clear finish. The only decoration (if you can call it that) is the box joint pattern on the drawers.

The biggest problem with building a six-drawer chest is that you actually have to build all those drawers. Getting six flush-mounted drawers to fit like a glove and slide like they're floating on air, now that's a challenge (for me at least).

Despite the fact there are drawers in it, building this chest turned out to be a pleasure. I think this was the result of three things. First, I enjoyed the 'exposed joinery' aspect of using box joints to construct the drawers. Second, the method of mounting the drawers created that 'floating on air' touch I've been striving for. And third, the entire chest was constructed with one basic joint — the box joint.

Not only are the drawers constructed of box joints, this joint is used on the plinth (kick board base), and a modified version is used to join the rails to the sides.

CONSTRUCTING THE CASE

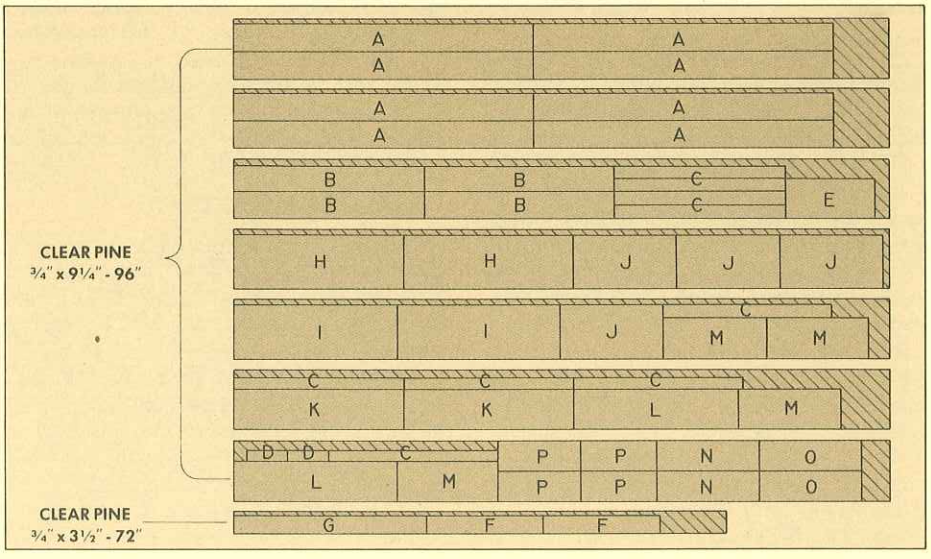
The case is surprisingly easy to build. The first step is to edge-glue four boards for each of the two sides and the top. (Each board is 4½" wide, and 44" long for the sides, 28" long for the top.)

To do this I simply ripped a clean edges

MATERIALS LIST

Overall Dimensions:		**43"h x 27"w x 16"d**
A	**Side Pcs.**	**(8) ¾ x 4½ - 42⅝**
B	**Top Pcs.**	**(4) ¾ x 4½ - 27**
C	**Rails**	**(9) ¾ x 1¾ - 25**
D	**Divider Rails**	**(2) ¾ x 1¾ - 5⅞**
E	**Divider**	**(1) ¾ x 5⅞ - 12¾**
F	**Base, Side**	**(2) ¾ x 3 - 16¼**
G	**Base, Front**	**(1) ¾ x 3 - 27**
H	**Drawer Front**	**(2) ¾ x 8½ - 24**
I	**Drawer Back**	**(2) ¾ x 8½ - 23**
J	**Drawer Sides**	**(4) ¾ x 8½ - 14½**
K	**Drawer Front**	**(2) ¾ x 6½ - 24**
L	**Drawer Back**	**(2) ¾ x 6½ - 23**
M	**Drawer Sides**	**(4) ¾ x 6½ - 14½**
N	**Drawer Front**	**(2) ¾ x 4½ - 11⅝**
O	**Drawer Back**	**(2) ¾ x 4½ - 10⅝**
P	**Drawer Sides**	**(4) ¾ x 4½ - 14½**
Q	**Drawer Btm.**	**(4) ¼ x 13½ - 23**
R	**Drawer Btm.**	**(2) ¼ x 13½ - 10⅝**
S	**Back**	**(1) ¼ x 24½ - 42**

CUTTING DIAGRAM



on each board, spread glue on one edge, and clamped the boards together. (I don't think there's any need for dowels or splines when edge-gluing.) After the glue was dry, I scraped off the excess and planed (by hand) these three pieces to a flat even surface. (See *Woodsmith* No. Fifteen for more on this technique.)

The top can be trimmed to final dimensions of 16" x 27", and the sides to 15½" x 42⁵⁄₁₆". At this point, the top is done. The rest of the work is on the sides and rails.

CUTTING THE RAILS. The best way to join the rails (the horizontal pieces between the drawers) to the sides is with twin mortise and tenon joints. The normal procedure is to cut the mortises first and then cut the tenons to fit. But I switched things around this time.

Since I was going to use box joints on all the drawers, I discovered that the jig for cutting the box joint was ideal for cutting a simplified version of a twin tenon. Thus, it was easier to cut the tenons first, and then cut the mortises to fit.

First, the nine drawer rails were ripped to 1¾" width and 25" length, and the two short divider rails (between the top drawers) were cut off at 5⁵⁄₁₆" long. Then I set up the box joint jig (as described on page 12) and cut the 'twin tenons' at both ends of all these rails. (This amounts to making one and a half cuts, as shown in Fig. 4.)

CUTTING THE MORTISES. Now the tenons can be used as templates to mark the outline of the mortises in the sides pieces. The placement of these mortises is shown in Fig. 1. (Note: the mortises begin ¼" from the front edge, but ½" on the back edge to allow for the rabbet, Figs. 2 and 3.)

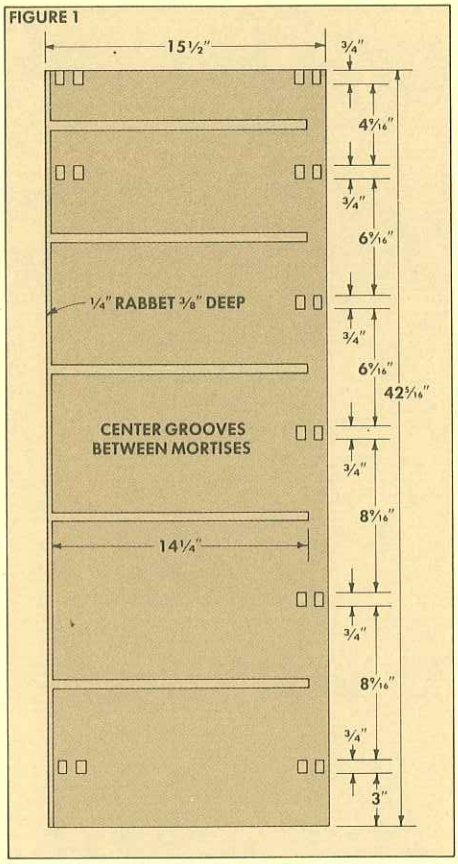
After marking the location of all the mortises, I used a Portalign attachment on a drill to rough-out the mortises. Then I squared-up the cheeks (sides of the mortise) with a butt chisel. There are 18 mortises to cut in each side, but after you get in the swing, it goes pretty fast.

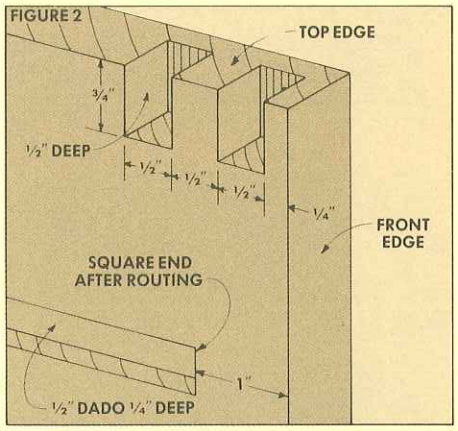
In addition to the mortises in the sides, four more sets must be cut in the four top rails for the center drawer dividers.

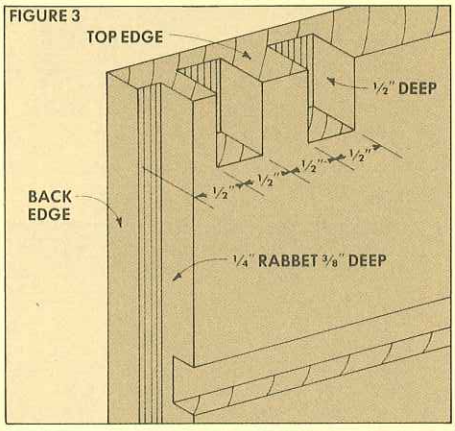
DRAWER DIVIDER. A divider must be cut and mounted between the two center divider rails, Fig. 5. The divider is joined to the rails with a simple mortise and tenon.

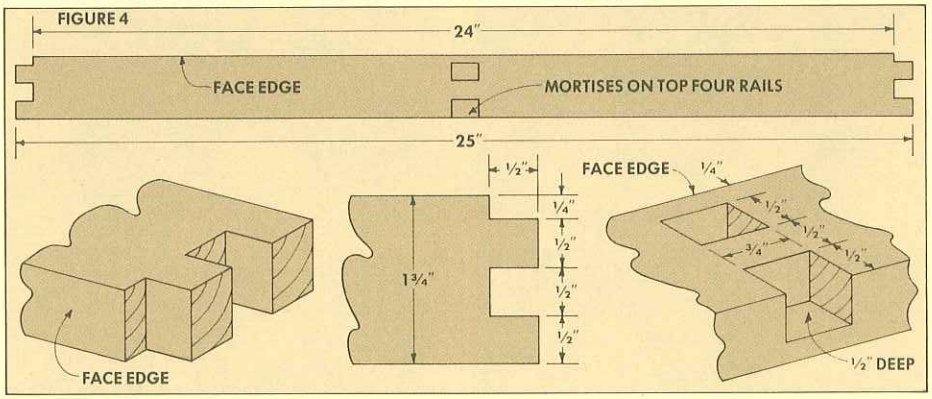
DADOES FOR FILLETS. The drawers are mounted to the chest with fillets (drawer slides that fit in a groove in the side of the drawer). To mount the fillets, dadoes are cut so they're centered *exactly* between the mortises for the rails. (Exact centering is important; do it with care.) I cut these dadoes with a router and clamped-on fence arrangement, stopping them 1" from the front edge. Then I squared up the corners, see Fig. 5.

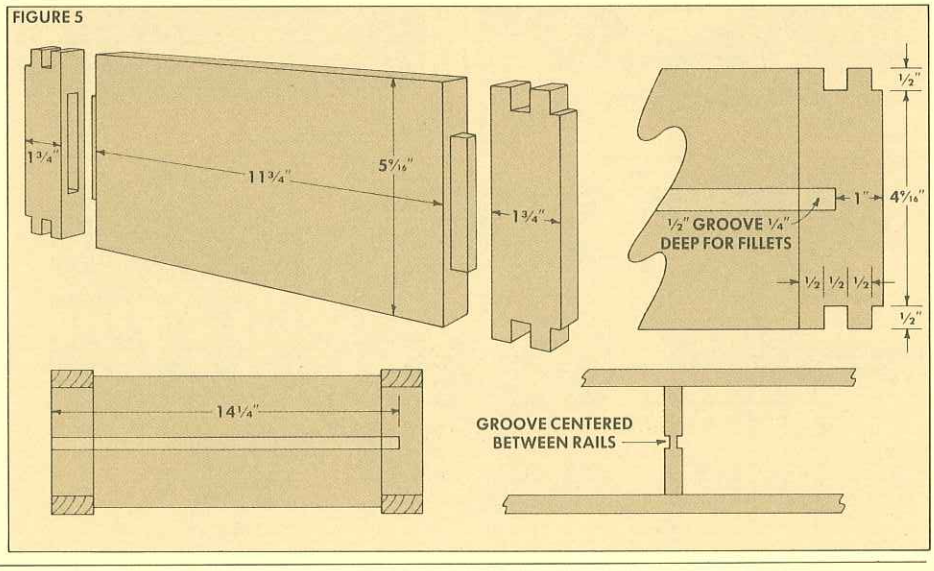
RABBETS. The last step on the sides is to cut rabbets along the back edges to mount the plywood back.

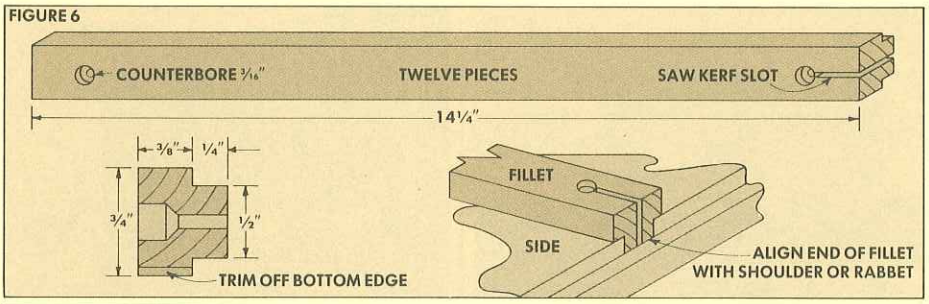


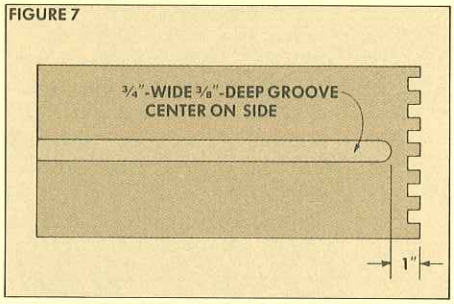


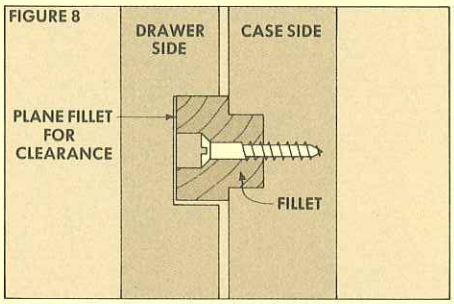


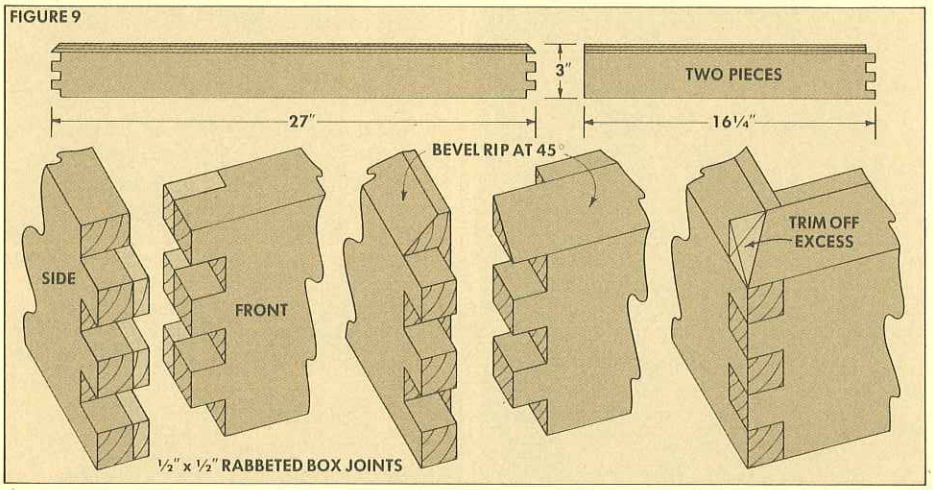


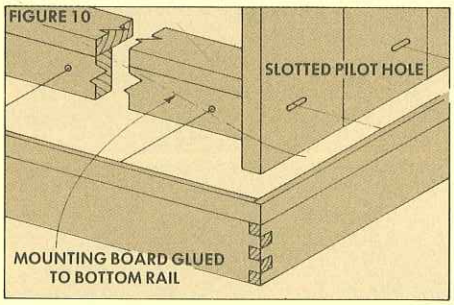


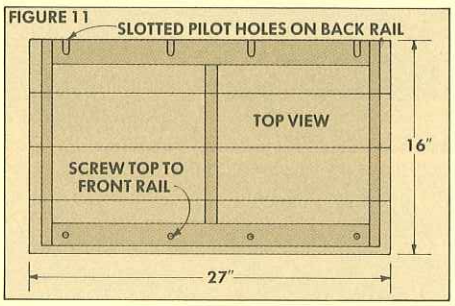


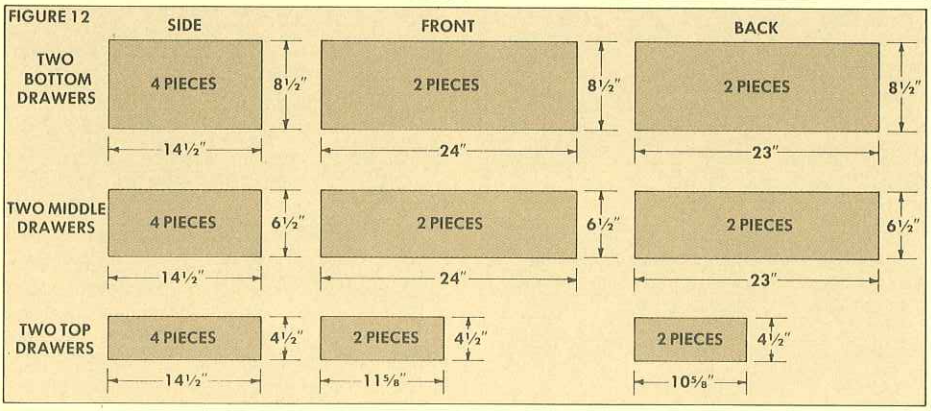












FILLETS, PLINTH, AND TOP

Once all the work is done on the sides and rails, you're on the home stretch. The case can now be dry-assembled to check everything out. What remains is making and attaching the fillets and the plinth.

THE FILLETS. The fillets (or drawer slides) are simply strips of hardwood (maple is the best choice) mounted to the sides of the case to support the drawer.

First, hardwood strips are cut to the dimensions shown in Fig. 6. Then rabbets are cut on two edges to form a tongue that fits exactly in the dadoes in the side pieces. The part of the fillet that sticks out from the side must fit into a ¾"-wide grooves that will be cut in the drawer sides (Fig. 7). The width of this part can be trimmed just a smidgen less than ¾" wide so the drawers slide easily. To mount the fillets, counterbore pilot holes at the front and back ends, Fig. 8. Then cut a slot at the back end, through the pilot hole.

Shop Note: Since the sides of the case are solid wood, they will move (expand/contract) with changes in humidity. The slot allows the fillet to slide on the back screw as the sides of the case move. For this reason the fillets are screwed into the dado, but no glue is used.

THE PLINTH. The plinth (or kick board) is assembled with rabbeted box joints (see next page). After cutting the box joints, the top edges of these three pieces are chamfered at 45°, Fig. 9.

Later, when the case is glued-up, the plinth is attached to the case from the inside with screws only. There's no expansion problem along the front, but on the sides, the pilot holes for the screws should be slotted to allow for movement.

ATTACHING THE TOP. The same precaution taken for attaching the fillets and the plinth also applies to the top. Pilot holes are drilled through the front rail to screw (no glue) the top in place. However, the pilot holes on the back rail should be slotted, see Fig. 11.

Finally, the case can be glued-up. I glued and clamped the four top rails and the center dividers together first. Then this unit and all the other rails are glued into the mortises in the sides. This requires a lot of bar clamps and constant checking to make sure the case is square.

THE DRAWERS. We've given the dimensions of the drawers in Fig. 12. The procedure for building them is described in detail on the next page.

Finally, the case and the drawers were given three coats for *Hope's* Tung Oil Varnish. This is an extremely easy finish to apply (just wipe it on with a clean cloth). There's enough varnish in it to protect the wood, and give it a nice golden glow. The fillets were given two coats of furniture wax so the drawers slide easily.

Box Joint Drawers

USING A RABBETED BOX JOINT

Box joints are decorative and exceptionally strong joints. There is one small problem, however, if a regular box joint is used on a drawer. When the groove for the drawer bottom is cut, it slices through one of the pins, leaving a gap, Fig. 1. One way to conceal this groove is to stop the cut, but that's a real hassle.

I think a better approach is to cut a double rabbeted box joint. In addition to hiding the grooves, the rabbets reduce the thickness of the stock to ½". Thus, you can cut ½" x ½" box joints in ¾" stock (which I think is a visual improvement).

The procedure for cutting this joint is basically the same as cutting a regular box joint. However, you must determine ahead of time how deep the rabbet is going to be. If you're using ¾"-thick stock, you'll probably want a ¼" deep rabbet.

To cut a ½" x ½" rabbeted box joint, set up the fence as described on page 12. The dado blade is set to a ½" width, and adjusted to a height just a smidgen over ½". Then the joint is cut as usual.

After the joint is cut, rabbets are cut on both pieces. The groove for the bottom can now be cut on both the front and sides without interfering with the joint, see Figs. 2 and 3.

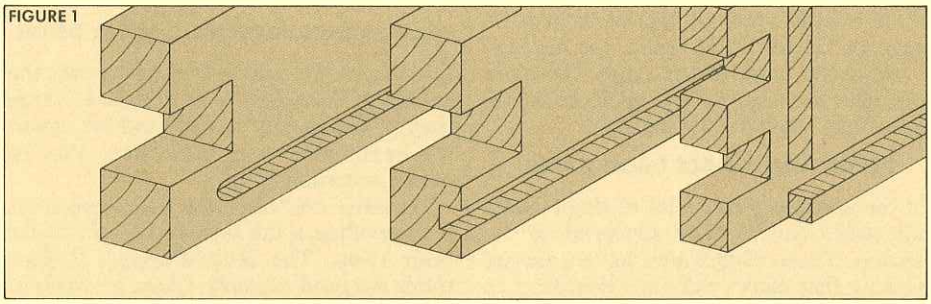
DRAWERS FOR THE CHEST

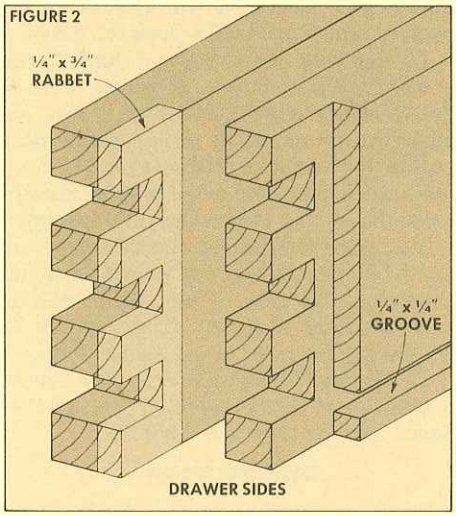
I should mention a few things about the drawers for the Six Drawer Chest. First, all the drawer fronts were cut with a slot (rather than a pin) on the top and bottom corners, Fig. 4. (This was for appearance only.) Also, the drawer backs are joined to the sides with a simple rabbet and groove joint, Fig. 5.

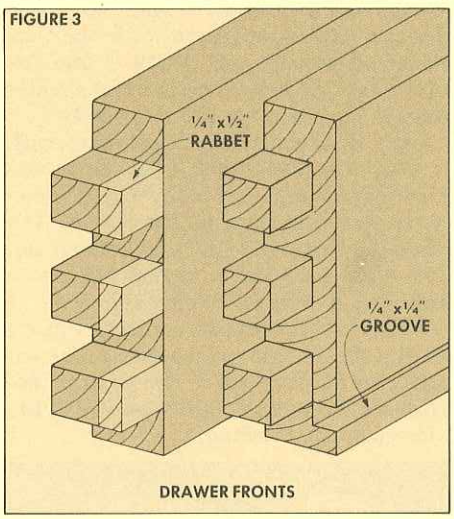
When building the drawers for the chest, measure the vertical distance between the rails on the chest. The height of the drawers should be 1/16" less than this measurement to allow for clearance.

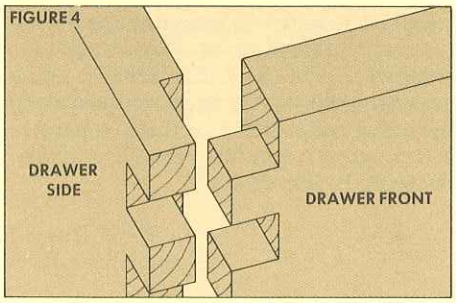
Then measure the width of the opening and build the drawers flush to this measurement (allowing no clearance). After the drawers are assembled, plane down the sides to a close (but not too tight) fit.

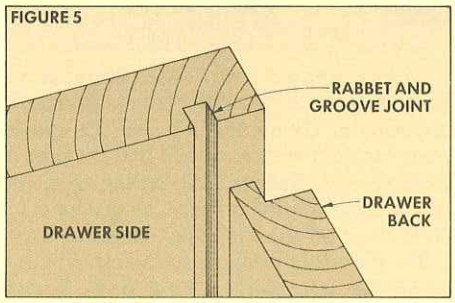
Finally, rout a ¾"-wide groove in the drawer sides to fit the fillets in the case. Since the fillets are set back 1" from the front edge of the chest, and centered exactly between the rails, the groove in the drawer should be cut the same way — stopped 1" from the front, and exactly centered on the height of the drawer. (Thus the fillets act as both a guide and a stop.) The result of all this precision will be a drawer that fits like a glove and floats on air.

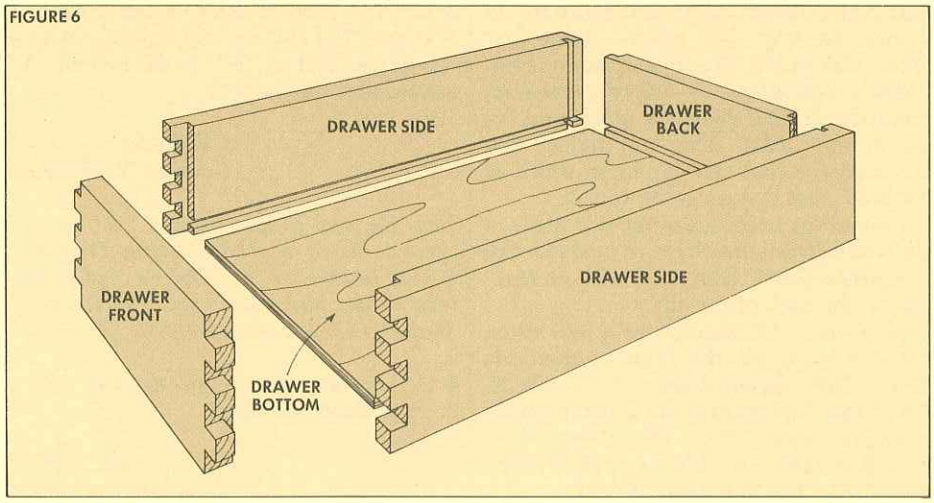












Talking Shop

AN OPEN FORUM

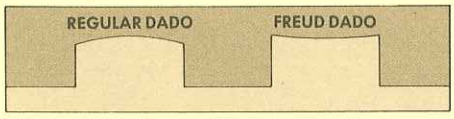
We didn't have room in this issue for a full page on "Tools of the Trade," so I'm borrowing some space on this page. There are two tools we used for the projects in this issue that I found very helpful.

FREUD ADJUSTABLE DADO BLADE

In the past few years a lot of single-blade adjustable dadoes have appeared on the market. These dado blades have a special housing that allows infinite adjustment to cut any width between ⅛" and 13/16". While this is a nice improvement over the two-blade-and-chipper sets, there is one disadvantage: the bottom of the cut is slightly concave (rounded) on the wider cuts.

Okay Don, everybody knows this stuff, so what's the point? Well, I just ran across a new dado blade. And to my way of thinking it's the best thing on the market. It's called the *Freud AD-600* Adjustable Dado. This dado looks like a typical adjustable dado, but it sure doesn't cut the same.

First of all, the carbide cutting teeth are set at a slight angle so they cut an (almost) perfectly flat bottom. I say 'almost' because the bottom is slightly *convex* at the wide cuts, see drawing.



Achieving a perfectly flat bottom (at all widths) on an adjustable blade is probably impossible. Given that, I feel it's much easier to deal with a convex bottom than a concave one. Rather than trying to clean up the two rounded corners, all you have to do is clean off the high spot in the center.

The *Freud* dado head has one other thing going for it: quality. Most dado heads would give Mount St. Helens a run for its money the way they make a table saw shake and rattle. The *Freud* blade is extremely well balanced — there's almost no vibration, it's unbelievably quiet, and it's sharp, very sharp. The only (minor) disadvantage is that the minimum width of cut is ¼", but it does go up to 13/16".

I guess my enthusiasm for this blade is the result of the smooth cuts it made for the box joints. Good clean cuts, with no tear-out on the back of the cut.

If you're in the market for a new dado, I'd sure look into the *Freud* Adjustable Dado. The suggested list price is $93.35. To obtain information on a retail outlet near you, write: Freud USA, Dept. W-17, P.O. Box 7187, 218 Feld Ave., High Point, NC 27264. (Toll free: 800-334-4107).

SEARS MULTI-PURPOSE ROUTER GUIDE

I think a lot of woodworkers under-rate the quality of Sears *Craftsman* tools. It's true they're 'home-shop' quality and not meant for heavy-duty use. But then, they're priced accordingly.

If there's one thing that Sears excels at, it's providing a full line of accessories for their tools. The Multi-Purpose Router Guide is a good example. Okay, it's made of high-impact plastic, it will only fit Sears routers, and it costs $15 (look for sales).

If you have a Sears router, I think this is a worthwhile addition. It comes with a dual-purpose edge guide that works on straight-line edges or along an outside radius. It also comes with a laminate trimmer attachment, and a trammel (pivoting) point for cutting circles up to 12" radius.

I used this attachment to cut the grooves and rabbets in the Stereo Cabinet shown in this issue. It's easy to use, light-weight, and very easy to adjust. And I'm sure it will be getting a lot of use in our shop.

The *Sears* Multi-purpose Router Guide is available at Sears stores, or through the Sears Catalog (No. 9 HT 25179).

TALKING SHOP

• Re: Glass Cutting (*Woodsmith* No. Thirteen). It seems to work much better if glass is always stressed at its weakest point (as pictured in Fig. 3 of that article). Glass does not break evenly when stressed along the entire score line. It actually separates in a progressive fashion, from one end of the score to the other.

David Russell
Rochester, New York

• Re: T.V. Tray Tables, *Woodsmith* No. Sixteen. The cutting diagram shows two "A" pieces and no "F". Is the second "A" supposed to be an "F"?

William T. Jessett
Camas, Washington

Yes, the two pieces labeled "A" on the second board in the Cutting Diagram should be labeled "F". There's also a mistake in the Materials List. The Plywood Tray (G) should measure ¼" x 12" - 21½".

• Is there any wood glue that will take a stain without showing?

Lamar Parker
Savannah, Tennessee

No, none that I know of. However, you can add stain to the glue (a few drops of food coloring) to make it more visible so it can be completely scraped off prior to staining the wood.

• It's always a pleasure to receive your magazine . . . (however) I do have one complaint. Several months ago I asked you for a jig to make box (finger) joints on a radial arm saw. You, as yet, have not honored my request.

However, *Fine Woodworking* magazine beat you to it in their May/June 1981 issue (No. 28), page 76. Mr. Ken Mitchell's article on "Cutting Box Joints On The Radial Arm Saw" is quite enlightening. I intend to experiment with his jig.

Edgar Mena
Vallejo, California

I've never been able to come up with a suitable jig for cutting box joints on a radial arm saw. I saw Mr. Mitchell's article, and I too want to try it out. (Back issues of Fine Woodworking *are available from: The Taunton Press, Box 5506, Newton CT 06470.)*

• I have two questions. First, what is the best method for joining long boards edge to edge? Dowels? Splines?

Second, I'm making a large outdoor sign out of redwood. What type of glue would be best for joining boards that will be constantly exposed to the elements?

Terry Olsen
Ft. Smith, Arkansas

I think the best method for joining boards edge to edge is a simple butt joint. Although dowels or splines are sometimes helpful to align warped boards, or boards of unequal thicknesses, the use of either of these methods can actually weaken the joint. For the outdoor sign, just clean up the edges on a jointer, apply the glue, and clamp them together. (For more information on edge-gluing boards, see Woodsmith *No. Fifteen.)*

The best glue for outdoor use is resorcinol glue. It is a two-part glue (liquid catalyst and powered resin) that must be mixed. It's very strong and quite easy to use. Three brands are: U.S. Plywood, Weldwood, and Elmer's.